Stormwater Division

MEMORANDUM

DATE: March 12, 2010

TO: Michael J. Gillis, Virginia Correctional Enterprises Document Management Services

FROM: Jo Anna Ripley, Stormwater

PO: 270712

RE: Files Approved for Scanning

General File ID or BMP ID: WC046

PIN: 1310100020

Subdivision, Tract, Business or Owner Name (if known): Williamsburg James City County Schools

Property Description: Stonehouse Elementary

Site Address: 3651 Rochambeau Drive

(For internal use only) **Box** 22 **Drawer:** 9

Agreements: (in file as of scan date) **N** **Book or Doc#:** **Page:**

Comments

WJCC Stonehouse Elem. School

WC 046

Williamsburg Schools

010010662

3651 Rochambeau

1310100020

DECLARATION OF COVENANTS

INSPECTION/MAINTENANCE OF DRAINAGE SYSTEM Stonehouse Elem.

THIS DECLARATION, made this 11th day of June, 2001, between Williamsburg-James City County Public Schools, and all successors in interest, hereinafter referred to as the "COVENANTOR(S)," owner(s) of the following property: 3651 Rochambeau Drive, Deed Book P.B.70, Page No. 34 or Instrument No. 980 015630, and James City County, Virginia, hereinafter referred to as the "COUNTY."

WITNESSETH:

We, the COVENANTOR(S), with full authority to execute deeds, mortgages, other covenants, and all rights, titles and interests in the property described above, do hereby covenant with the COUNTY as follows:

1. The COVENANTOR(S) shall provide maintenance for the drainage system including any runoff control facilities, conveyance systems and associated easements, hereinafter referred to as the "SYSTEM," located on and serving the above-described property to ensure that the SYSTEM is and remains in proper working condition in accordance with approved design standards, and with the law and applicable executive regulations. The SYSTEM shall not include any elements located within any Virginia Department of Transportation rights-of-way.

2. If necessary, the COVENANTOR(S) shall levy regular or special assessments against all present or subsequent owners of property served by the SYSTEM to ensure that the SYSTEM is properly maintained.

3. The COVENANTOR(S) shall provide and maintain perpetual access from public right-of-ways to the SYSTEM for the COUNTY, its agent and its contractor.

4. The COVENANTOR(S) shall grant the COUNTY, its agent and its contractor a right of entry to the SYSTEM for the purpose of inspecting, operating, installing, constructing, reconstructing, maintaining or repairing the SYSTEM.

5. If, after reasonable notice by the COUNTY, the COVENANTOR(S) shall fail to maintain the SYSTEM in accordance with the approved design standards and with the law and applicable executive regulations, the COUNTY may perform all necessary repair or maintenance work, and the COUNTY may assess the COVENANTOR(S) and/or all property served by the SYSTEM for the cost of the work and any applicable penalties.

JUN 15 0268

6. The COVENANTOR(S) shall indemnify and save the COUNTY harmless from any and all claims for damages to persons or property arising from the installation, construction, maintenance, repair, operation or use of the SYSTEM.

7. The COVENANTOR(s) shall promptly notify the COUNTY when the COVENANTOR(S) legally transfers any of the COVENANTOR(S)' responsibilities for the SYSTEM. The COVENANTOR(S)' shall supply the COUNTY with a copy of any document of transfer, executed by both parties.

8. The covenants contained herein shall run with the land and shall bind the COVENANTOR(S) and the COVENANTOR(S)' heirs, executors, administrators, successors and assignees, and shall bind all present and subsequent owners of property served by the SYSTEM.

9. This COVENANT shall be recorded in the County Land Records.

IN WITNESS WHEREOF, the COVENANTOR(S) have executed this DECLARATION OF COVENANTS as of this 11th day of June, 2001.

COVENANTOR(S)

J. David Martin

Print Name/Title J. David Martin, Ed.D.
Division Superintendent

ATTEST:

COVENANTOR(S)

Print Name/Title

ATTEST:

COMMONWEALTH OF VIRGINIA
CITY/COUNTY OF James City

I hereby certify that on this 11th day of June, 2001, before the subscribed, a Notary Public of the State of Virginia, and for the City/County of James City, aforesaid personally appeared J. David Martin and did acknowledge the aforegoing instrument to be their Act.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal this 11th day of June, 2001.

Janet Lynn Cerza
Notary Public

My Commission expires: 11/30/02

JUN 15 0269

Approved as to form:

Deputy County Attorney

This Declaration of Covenants prepared by:

J. David Martin, Ed.D.
(Print Name)

Division Superintendent
(Title)

101-D Mounts Bay Rd.
(Address)

Williamsburg, VA 23185
(City) (State) (Zip)

VIRGINIA: City of Williamsburg and County of James City, to Wit:
In the Clerk's Office at the Circuit Court for the City of Williamsburg and County of James City the 15 day of June, 2001 this Declaration was presented with the certificate annexed and admitted to record at 12:06 P.M. o'clock.
Teste:
By: Deputy Clerk

drainage.pre
Revised 2/97

Date Record Created:

Created By:

WS_BMPNO: WC046

Print Form

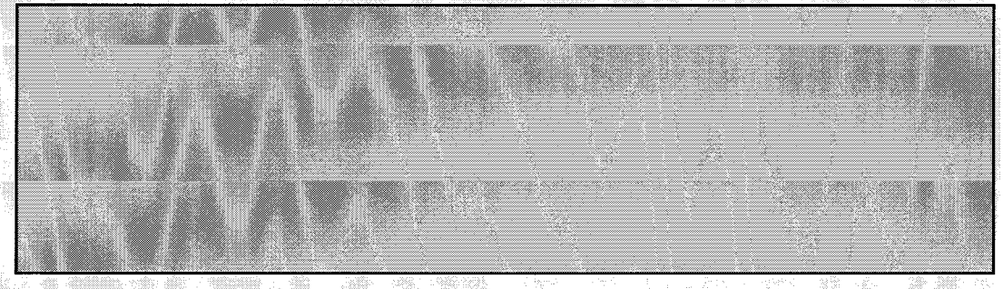
PRINTED ON:
Friday, March 12, 2010
3:56:00 PM

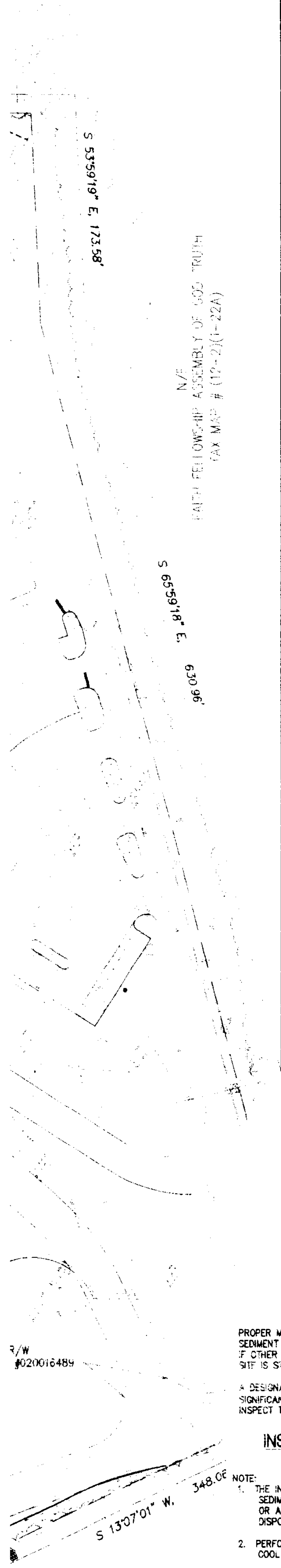
WATERSHED	WC
BMP ID NO	046
PLAN NO	SP-8-99
TAX PARCEL	(13-1)(1-20)
PIN NO	1310100020
CONSTRUCTION DATE	9/1/2000
PROJECT NAME	WJCC Stonehouse Elem School
FACILITY LOCATION	3651 Rochambeau Drive (NW Corner)
CITY-STATE	Williamsburg, Va. 23168
CURRENT OWNER	WJCC Schools
OWNER ADDRESS	P.O. Box 8784
OWNER ADDRESS 2	
CITY-STATE-ZIP CODE	Williamsburg, Va. 23187
OWNER PHONE	
MAINT AGREEMENT	Yes
EMERG ACTION PLAN	No

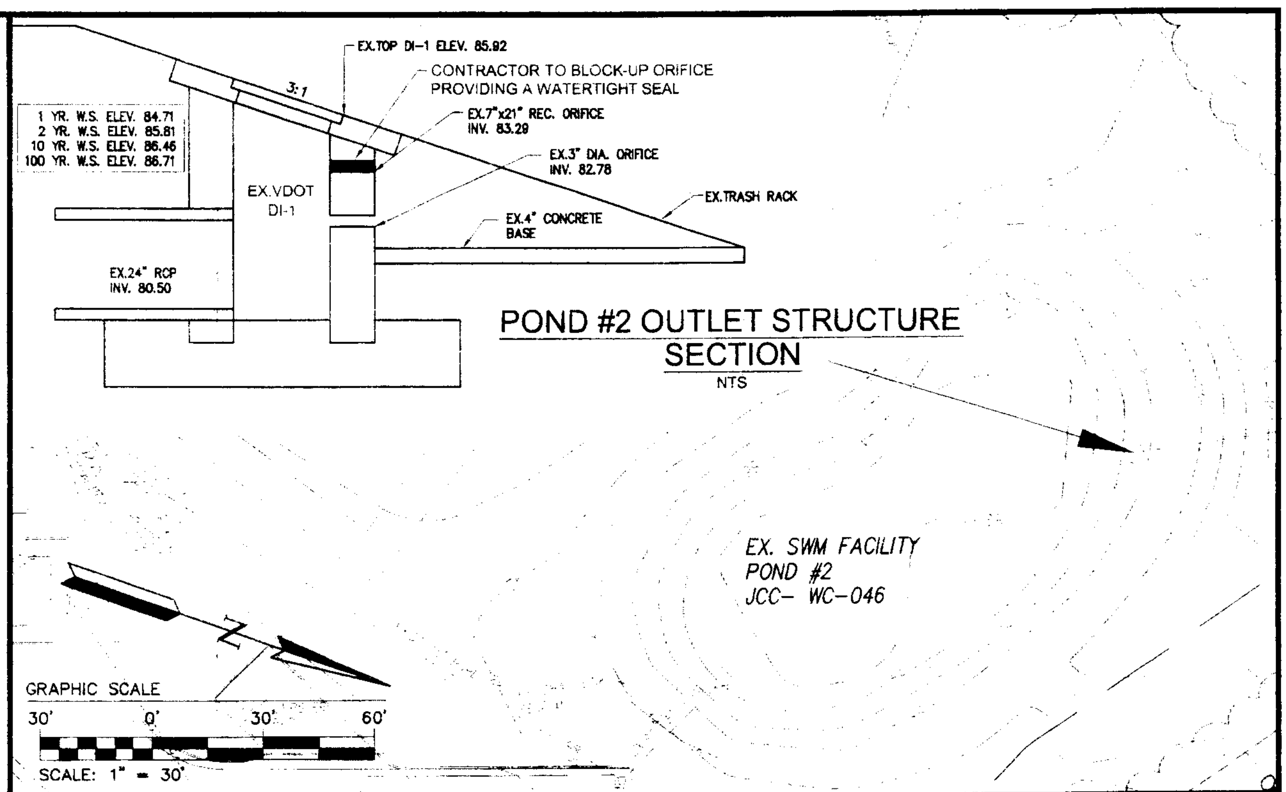
Get Last BMP No | Return to Menu

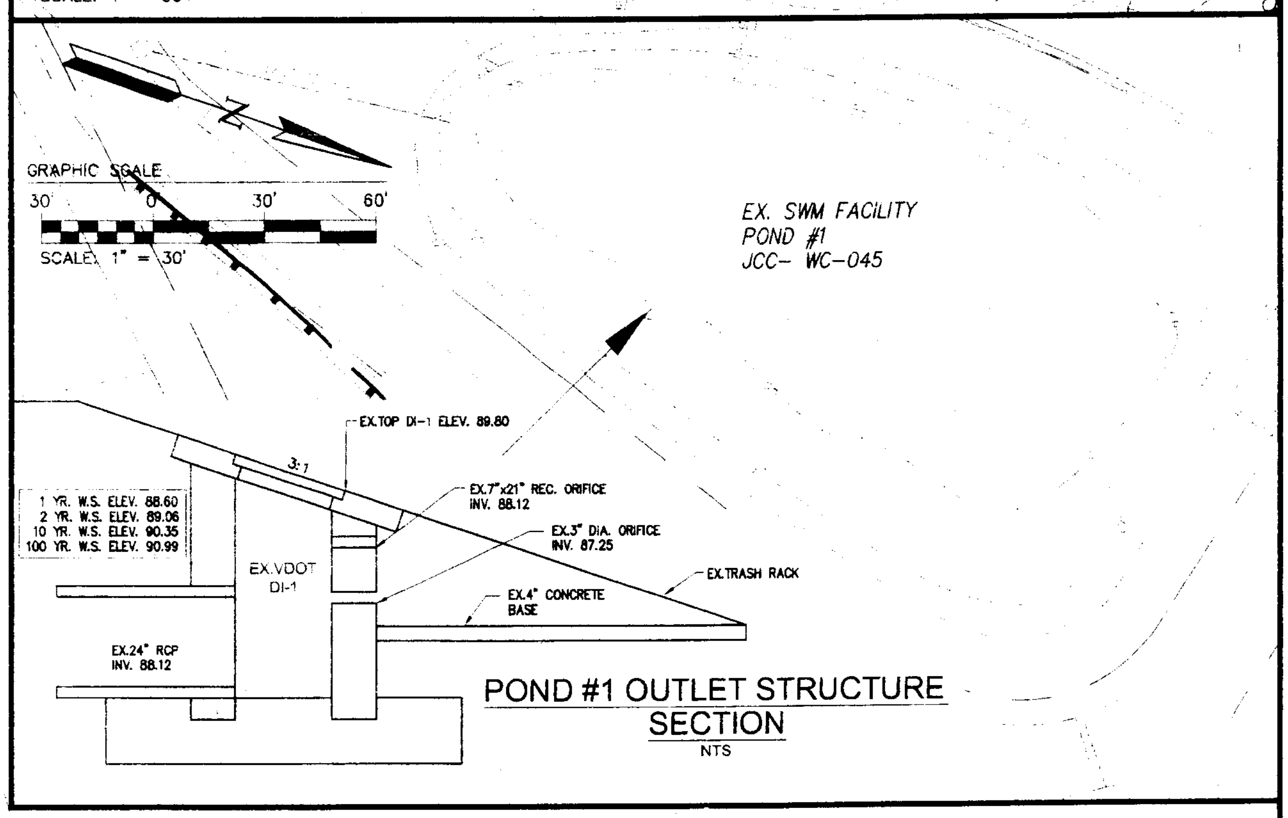
MAINTENANCE PLAN	No	CTRL STRUC DESC	Conc. Inlet
SITE AREA acre	26	CTRL STRUC SIZE inches	DI-1
LAND USE	Elementary School	OTLT BARRL DESC	RCP Barrel
old BMP TYP	Dry Pond - SM	OTLT BARRL SIZE inch	24
JCC BMP CODE	B1 Shallow Marsh		
POINT VALUE	9	EMERG SPILLWAY	No
		DESIGN HW ELEV	83.86
		PERM POOL ELEV	na
SVC DRAIN AREA acres	8.07	2-YR OUTFLOW cfs	3.50
		10-YR OUTFLOW cfs	
		REC DRAWING	Yes
SERVICE AREA DESCRI	School, Fields, Parking & Roads		
IMPERV AREA acres	1.26	CONSTR CERTIF	No
RECV STREAM	UT of Frances Swamp		
EXT DET-WQ-CTRL	Yes	LAST INSP DATE	Inspected by:
WTR QUAL VOL acre-ft	0.1275	INTERNAL RATING	
CHAN PROT CTRL	No		
CHAN PROT VOL acre-ft	0	MISC/COMMENTS	
SW/FLOOD CONTROL	Yes	7th Elem School. Also See WC045.	
GEOTECH REPORT	Yes		

Additional Comments:









STORMWATER MANAGEMENT/ BMP FACILITY MAINTENANCE PLAN

PROPER MAINTENANCE OF THIS FACILITY IS ENCOURAGED TO PREVENT THE INTRODUCTION OF DEBRIS AND SEDIMENT IN TO THE FACILITY, SPILLWAY AND DOWNSTREAM WATERWAYS. INSPECTIONS FOR SEDIMENT BUILDUPS MUST BE PERFORMED AT LEAST QUARTERLY. IT IS ANTICIPATED THAT UNDER NORMAL CONDITIONS, SEDIMENT REMOVAL FROM THE FACILITY WILL BE REQUIRED ONCE EVERY 10 YEARS. IF OTHER CONSTRUCTION OR RELATED ACTIVITIES ARE PERFORMED ON UPSLOPE AREAS, ADEQUATE PROTECTION MUST BE PROVIDED AND INSPECTIONS PERFORMED AT LEAST ONCE WEEKLY UNTIL THE ENTIRE SITE IS STABILIZED.

A DESIGNATED REPRESENTATIVE OF THE OWNER MUST INSPECT THE SWM STRUCTURE AFTER EACH SIGNIFICANT RAINFALL EVENT OR THE FOLLOWING WORKING DAY IF A WEEKEND OR HOLIDAY OCCURS. A SIGNIFICANT RAINFALL FOR THIS STRUCTURE IS DEFINED AS ONE (1) INCH OR MORE OF GAUGED RAINFALL WITHIN A 24 HOUR PERIOD. ONCE PER YEAR, A REPRESENTATIVE OF THE COUNTY MAY JOINTLY INSPECT THE FACILITY. APPROPRIATE ACTION MUST BE TAKEN TO ENSURE PROPER MAINTENANCE.

INSPECTION AND MAINTENANCE OF THE FACILITY WILL CONSIST OF THE FOLLOWING ADDITIONAL MEASURES:

NOTE:

1. THE INSPECTION FOR SEDIMENT BUILDUP WITHIN THE FACILITY MUST BE PERFORMED BY VISUAL INSPECTION AND A PHYSICAL DETERMINATION OF SEDIMENT DEPTH WITHIN THE STORAGE AREA. IF THE SEDIMENT REACHES A DEPTH OF 1.0 FT. ABOVE THE DESIGN BOTTOM OF THE FACILITIES, OR IF SEDIMENT THREATENS TO CLOG THE OUTLET STRUCTURE, REMOVAL IS REQUIRED. AT THE SAME TIME, OR AT LEAST ONCE PER YEAR, THE RISER BOTTOM AND OUTLET PIPE MUST BE CLEANED OF ACCUMULATED SEDIMENTS. DISPOSE OF SEDIMENTS REMOVED FROM THE FACILITY AT AN ACCEPTABLE DISPOSAL AREA.
2. PERFORM MAINTENANCE MOWING OF POND GRASSES AT LEAST TWICE EACH YEAR. GRASSES SUCH AS TALL FESCUE SHOULD BE MOWED IN EARLY SUMMER AFTER EMERGENCE OF THE HEADS ON COOL SEASON GRASSES AND IN LATE FALL TO PREVENT SEEDS OF ANNUAL WEEDS FROM MATURING. MOWING OF LEGUMES CAN BE LESS FREQUENT.
3. PERFORM QUARTERLY INSPECTIONS OF THE RISER SECTION FOR THE OBSERVANCE OF COLLECTED DEBRIS. IMMEDIATELY REMOVE ANY DEBRIS TO MAINTAIN THE INTEGRITY OF THE STRUCTURE AND PROVIDE AN ATTRACTIVE APPEARANCE.
4. PERFORM QUARTERLY INSPECTIONS OF THE SIDE SLOPES OF THE FACILITIES AND DOWNSTREAM WATERWAYS FOR SIGNS OF ANIMAL/RODENT BORROWS OR EROSION. IMMEDIATELY PERFORM NECESSARY REPAIRS, REFILLING OR STABILIZATION AS APPROPRIATE.
5. PERFORM YEARLY STRUCTURAL INSPECTIONS OF THE FACILITY FOR DAMAGE. STRUCTURAL INSPECTION SHALL BE PERFORMED ON THE CONCRETE RISER, TRASH RACK, ORIFICE/ WEIR(S), OUTLET BARREL AND POND EMBANKMENT. IF DAMAGE IS EVIDENT, REPAIRS MUST BE MADE IMMEDIATELY. DEPENDING ON THE TYPE OF DAMAGE, FURTHER INVESTIGATION BY A PROFESSIONAL ENGINEER MAY BE REQUIRED TO ASSESS THE INTEGRITY OF THE STRUCTURE.
6. RECORD KEEPING: THE OWNER OR DESIGNATED REPRESENTATIVE SHALL KEEP REASONABLE, ACCURATE WRITTEN RECORDS OR INSPECTIONS PERFORMED FOR THE STRUCTURE. RECORDS SHALL DOCUMENT THE REPAIRS PERFORMED. COPIES SHALL BE PROVIDED TO THE COUNTY UPON REQUEST.

No.	DATE	REVISION / COMMENT / NOTE	REVISED BY	REVIEWED BY
1	3/9/06	REVISIONS PER JCC COMMENT LETTER 1/25/06	LBA	NB

COMMONWEALTH OF VIRGINIA PROFESSIONAL ENGINEER 3/9/06 [illegible]

5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188
(757) 253-0040
Fax (757) 220-8994

CONSULTING ENGINEERS
WILLIAMSBURG • RICHMOND • GLOUCESTER

STORMWATER MANAGEMENT NOTES AND DETAILS

AMENDED SITE PLAN
STONEHOUSE ELEMENTARY SCHOOL
FOR THE
WJCC PUBLIC SCHOOLS

STONEHOUSE DISTRICT — JAMES CITY COUNTY, VIRGINIA

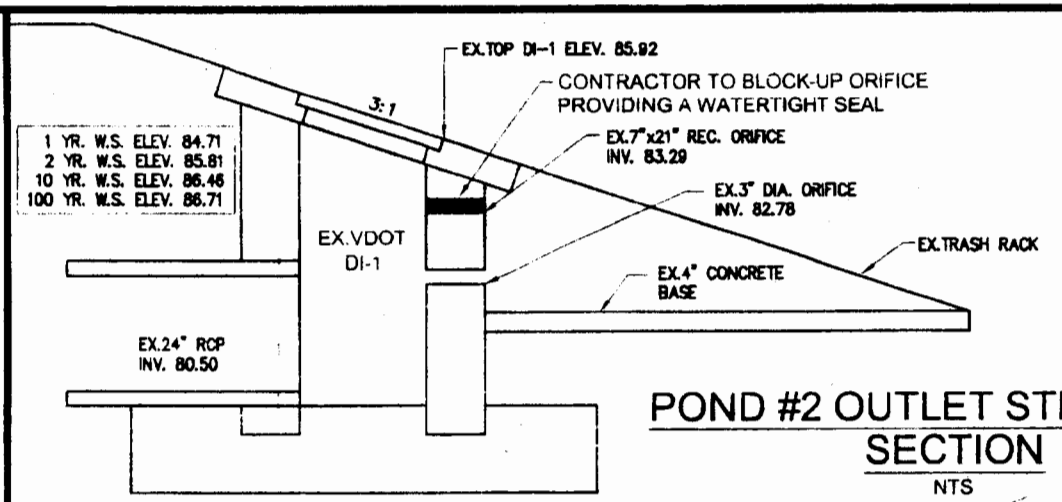
Designed	Drawn
LBA	LBA
Scale	Date
1"=60'	12/22/05

Project No. 9620-00

Drawing No.

CLASSROOM ADDITIONS TO

MARK DATE



POND #2 OUTLET STRUCTURE SECTION

NTS

S 53°59'19" E, 173.58'

N/F
FAITH FELLOWSHIP ASSEMBLY OF GOD TRUTH
TAX MAP # (12-2)(1-22A)

EX. SWM FACILITY
POND #2
JCC- WC-046

GRAPHIC SCALE
30' 0' 30' 60'
SCALE: 1" = 30'

NOT TO SCALE

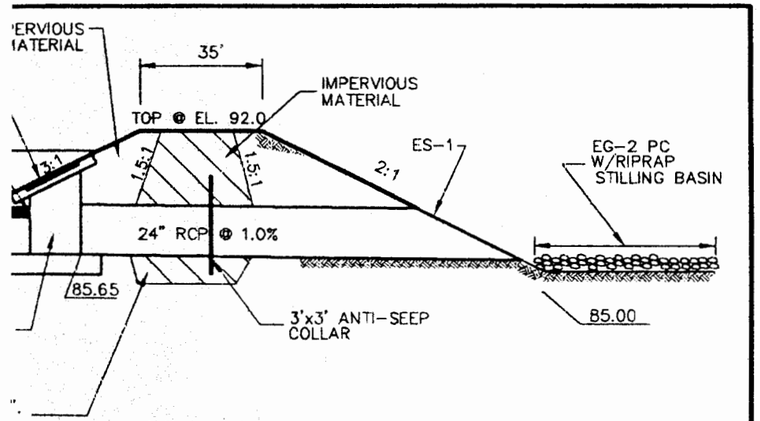
TEMPORARY SEDIMENT TRAP

NOT TO SCALE

PARTIAL ELEVATION

SEDIMENT TRAP DATA TABLE						
	Ho	W	L	WET VOLUME	DRY VOLUME	DIMENSIONS
	2.0	2.5	12'	3,402cf	3,402cf	37' x 37'

REMOVED AND THE TRAP RESTORED TO ITS ORIGINAL DIMENSIONS WHEN THE
IULATED TO ONE HALF THE DESIGN VOLUME OF THE WET STORAGE.
ROM THE BASIN SHALL BE DEPOSITED IN A SUITABLE AREA AND IN SUCH A
. NOT ERODE AND CAUSE SEDIMENTATION PROBLEMS.

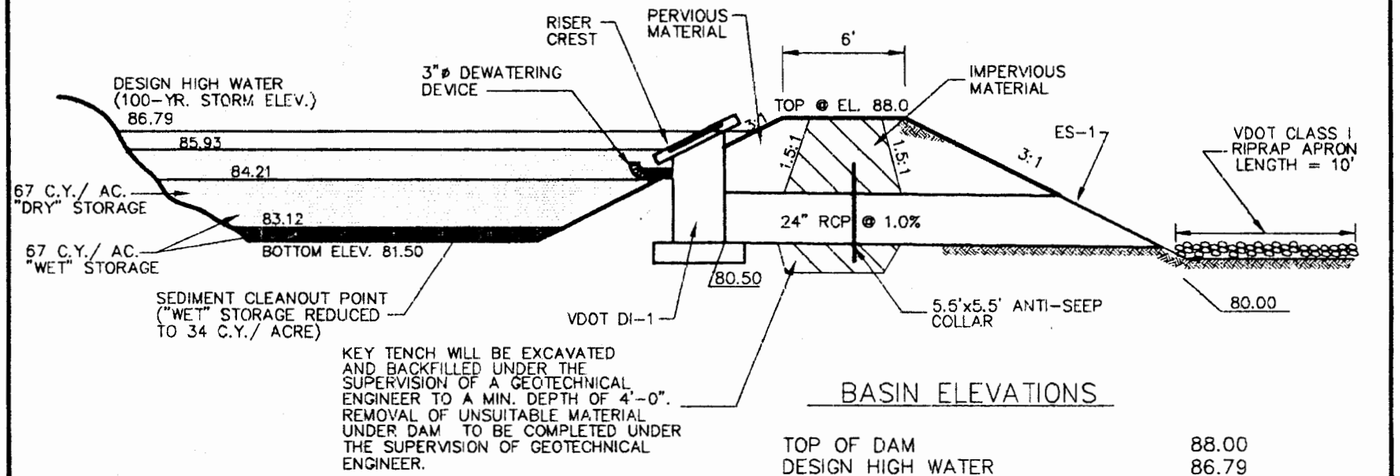


BASIN ELEVATIONS

TOP OF DAM	92.00
DESIGN HIGH WATER	91.03
PRINCIPAL SPILLWAY CREST	90.33
DEWATERING ORIFICE	89.19
CLEANOUT	88.59
BOTTOM OF BASIN	87.50

D. 1 OUTLET STRUCTURE

NOT TO SCALE



BASIN ELEVATIONS

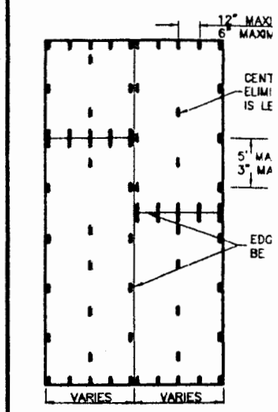
TOP OF DAM	88.00
DESIGN HIGH WATER	86.79
PRINCIPAL SPILLWAY CREST	85.93
DEWATERING ORIFICE	84.21
CLEANOUT	83.12
BOTTOM OF BASIN	81.50

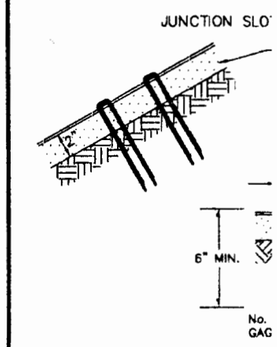
MATERIAL TO BE PLACED IN 6" TO 8" LOOSE LIFTS AND COMPACTED TO 95% MAXIMUM DRY DENSITY AT OPTIMUM MOISTURE CONTENT. FILL MATERIAL SHALL BE FREE FROM ORGANICS, STUMPS, ROOTS & OTHER

WC046

4 SEDIMENT BASIN NO. 2 OUTLET STRUCTURE

NOT TO SCALE





SOIL RETENTION

PROTE

10'x6'x26" VDOT CLASS I RIP RAP APRON SEE SHEET NO. C23 FOR OUTLET STRUCTURE DETAILS

SEDIMENT BASIN NO. 2 WC046

ES-1 OUTFALL INV.i=82.5

SEDIMENT BASIN NO. 2 WC046

ES-1 INV.i=82.5

36.01' OF 18" RCP @ 8.00%

75' BUILDING SETBACKLINE (TYP)

35' LANDSCAPE BUFFER

HP 94.63

65.39' OF 15" RCP @ 0.33%

26A MH
RIM= 93.60
INV.i=85.63
INV.o=85.53
TC 94.80

26 DI-1
RIM=91.20
INV.i=85.33
INV.i=87.95 27
INV.o=85.23

126.18' OF 15" RCP @ 0.30%

TC 95.18

31 DI-1
RIM=92.
INV.i=89
INV.o=8

150.84' OF 15" RCP @ 0.31%

94.35

94.50

95.6

TC 96.00

TC 95.30

27 DI-1
RIM=92.00
INV.i=89.50 33
INV.i=88.50 28

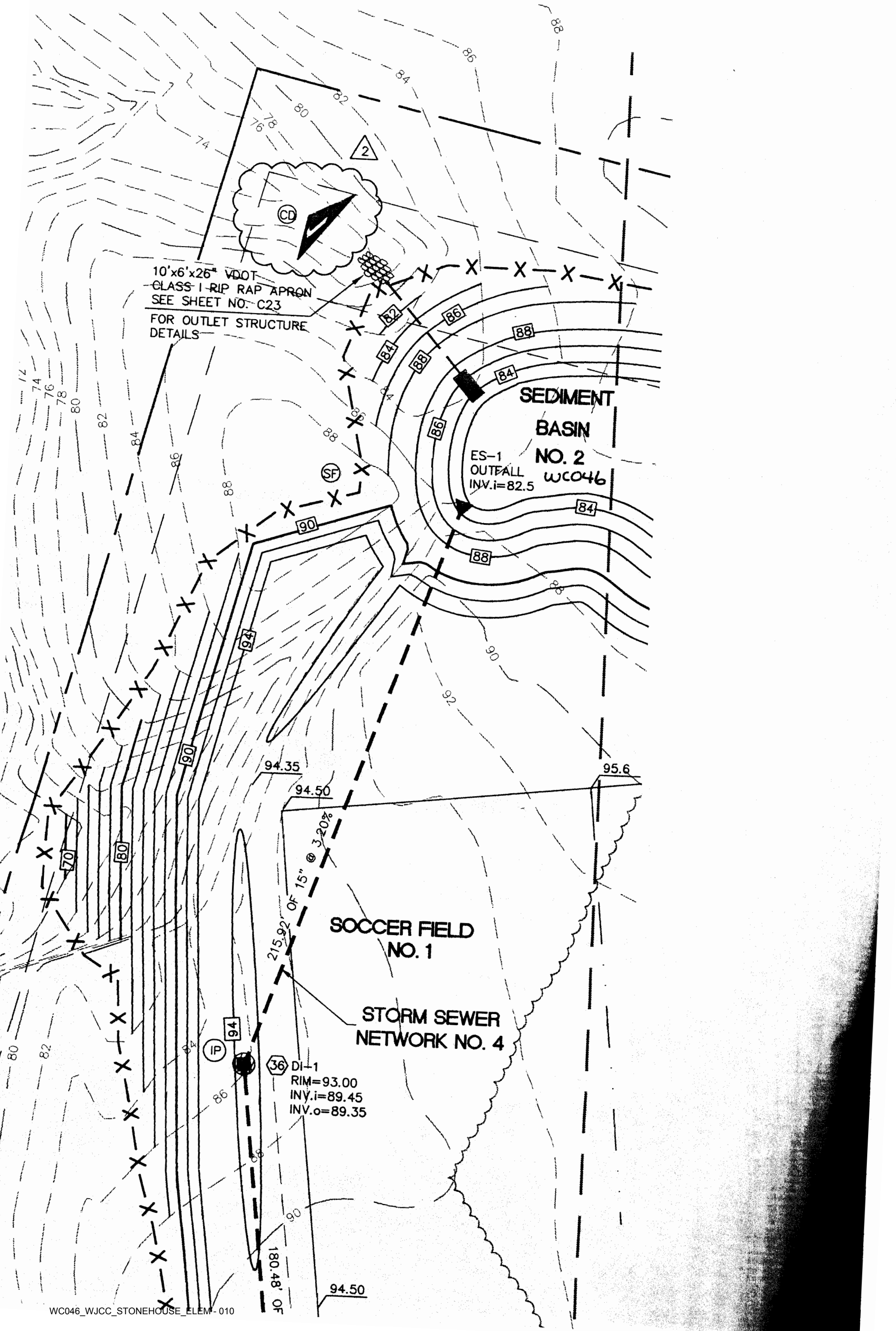
94.35

94.50

@ 3.20%

96

W6046_WJCC_STONEHOUSE_ELEM - 009


10'x6'x26' VDOT
CLASS I RIP RAP APRON
SEE SHEET NO. C23
FOR OUTLET STRUCTURE
DETAILS
SEDIMENT
BASIN
NO. 2
WC046
ES-1
OUTFALL
INV.i=82.5
SOCCER FIELD
NO. 1
STORM SEWER
NETWORK NO. 4
DI-1
RIM=93.00
INV.i=89.45
INV.o=89.35
94.35
94.50
95.6
94.50
215.92' OF 15" @ 3.20%
180.48' OF

35' LANDSCAPE BUFFER

75' BUILDING SETBACKLINE (TYP)

HP 94.63

SEDIMENT BASIN NO. 2

ES-1
INV.i=82.5

WC046

36.01' OF 18" RCP@ 8.00%

65.39' OF 15" RCP @ 0.33%

26A MH
RIM=93.60
INV.i=85.63
INV.o=85.53

TC 94.80

26 DI-1
RIM=91.20
INV.i=85.33 26A
INV.i=87.95 27
INV.o=85.23

126.18' OF 15" RCP @ 0.30%

TC 95.18

31 DI-1
RIM=92.00
INV.i=89.58
INV.o=86.00

150.84' OF 15" RCP @ 0.31%

140.67' OF 15" RCP @ 0.31%

TC 94.93

22 DI-1
RIM=91.8
INV.o=89.

94.35

94.50

TC 96.00

TC 95.30

27 DI-1
RIM=92.00
INV.i=89.50 33
INV.i=88.50 28
INV.o=88.40

96.8

32 DI-1

IP

86 88 90 94

SP-0039-2012

GENERAL NOTES

SITE IS CURRENTLY ZONED PUBLIC LANDS, R-2.
SITE ADDRESS: 3651 ROCHAMBEAU DRIVE
WILLIAMSBURG, VA 23188
TAX MAP PARCEL ID: 1310100020

1. APPLICANT: JAMES CITY COUNTY STORMWATER DIVISION
5320 PALMER LANE, SUITE 2A
WILLIAMSBURG VA. 23188
CONTACT: DARRYL COOK, P.E.
PHONE: (757) 259-1442
FAX: (757) 259-5833
EMAIL: DARRYL.COOK@JAMESCITYCOUNTYVA.GOV
2. PROPERTY SHOWN HEREON LIES IN ZONE "X", (AREA DETERMINED TO BE OUTSIDE THE 500 YEAR FLOOD PLAIN) PER F.I.R.M. #5109500130C, DATED 9/28/07.
3. PROJECT LIES WITHIN WARE CREEK WATERSHED.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING MISS UTILITY (1-800-552-7001) FOR EXISTING UTILITY LOCATIONS PRIOR TO COMMENCING CONSTRUCTION.
5. EXISTING UTILITY LOCATIONS SHOWN ARE APPROXIMATE AND SHALL BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO COMMENCING CONSTRUCTION ACTIVITIES.
6. ALL UTILITIES WILL BE PLACED UNDERGROUND.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS FOR THIS PROJECT.
8. THE PROFESSIONAL WHOSE SEAL IS AFFIXED HEREON SHALL ACT AS THE "RESPONSIBLE LAND DISTURBER" FOR PURPOSES OF PLAN APPROVAL ONLY. PRIOR TO ISSUANCE OF THE LAND DISTURBING PERMIT, THE CONTRACTOR SHALL PROVIDE THE NAME OF A "RESPONSIBLE LAND DISTURBER" WHO SHALL ASSUME RESPONSIBILITY AS THE "RESPONSIBLE LAND DISTURBER" FOR THE CONSTRUCTION PHASE OF THE PROJECT. THE OWNER OR DEVELOPER SHALL PROVIDE WRITTEN NOTIFICATION SHOULD THE "RESPONSIBLE LAND DISTURBER" CHANGE DURING CONSTRUCTION.
9. ALL OBJECTIONABLE AND DELETERIOUS MATERIALS IS TO BE REMOVED FROM THE SITE AND DISPOSED OF IN A STATE APPROVED FACILITY MEETING THE REQUIREMENTS OF ALL APPLICABLE LOCAL, STATE, AND FEDERAL REGULATIONS.
10. THIS SITE LIES WITHIN A PRIMARY SERVICE AREA.
11. CONTOUR INTERVAL IS 1 FOOT.
12. PLAN SURVEY AND TOPOGRAPHIC DATA WAS BASED UPON NGVD 1929 AND NAD 1983.
13. DAM FILL: FILL MATERIAL FOR USE ON THE DAM SECTION SHALL HAVE LESS THAN 1% ORGANIC MATERIAL BY WEIGHT AND SHALL BE FREE FROM DELETERIOUS SUBSTANCES. MATERIAL SHALL CONSIST OF A NON-EXPANSICE SOIL MATERIAL CLASSIFIED AS CLAY (CL AND CH) WITH AT LEAST 50% PASSING THE NO 200 SIEVE. THE FILL SOILS SHOULD CONTAIN A MAXIMUM OF 5% GRAVEL SIZE PARTICLES, WITH A MAXIMUM GRAVEL SIZE OF 3 INCHES. FILL MATERIAL SHALL BE PLACED IN MAXIMUM 8-INCH LOOSE LIFTS AND MOISTURE CONDITIONED TO WITHIN -1 TO +3% OF THE SOIL'S OPTIMUM MOISTURE CONTENT PRIOR TO COMPACTION. COMPACTION SHALL BE TO A MINIMUM DENSITY OF 95% OF THE SOIL'S STANDARD PROCTOR MAXIMUM DRY DENSITY (ASTM D698). A QUALIFIED SOILS TECHNICIAN UNDER THE DIRECTION OF A GEOTECHNICAL ENGINEER SHALL BE CALLED ON TO PROVIDE COMPACTION TESTING DURING FILL PLACEMENT TO ASSURE THAT THE MINIMUM COMPACTION REQUIREMENTS ARE BEING MET. AT LEAST 2 COMPACTION TEST SHALL BE PERFORMED PER LIFT.

SITE STATISTICS

PROJECT LIMITS:	25,149 S.F. (0.58 ACRES)
HYDROLOGIC UNIT CODE:	HUC Y062
JCC BMP#:	WC046

INDEX OF SHEETS

LEGEND

EXISTING		PROPOSED
EX. WATER	WATER	
EX. SAN.	SANITARY SEWER	
EX. FORCEMAIN	STORM SEWER	
	FORCE MAIN	
S	SANITARY MANHOLE	
	STORM MANHOLE	
	CURB DROP INLET	
	YARD DROP INLET	
	FLARED END SECTION	
	VALVE	
	FIRE HYDRANT ASSEMBLY	
	BLOW-OFF VALVE	
	AIR RELEASE ASSEMBLY	
SCO	CLEAN OUT	
WM	WATER METER	
	STREETLIGHT	
	CENTERLINE/BASELINE	
	RIGHT OF WAY	
	PROPERTY LINE	
	℄ DITCH/SWALE	
	CONCRETE LINED DITCH	
	EXISTING TREELINE	
	LIMITS OF CLEARING	
	RIP RAP	
	CURB	
	CURB AND GUTTER	
	REVERSE GUTTER PAN	
	EDGE OF PAVEMENT	
+28.1	EXISTING GROUND ELEVATION	
	PROPOSED SPOT GRADE	TC0.00
80	CONTOUR	80

E & S NARRATIVE

PROJECT DESCRIPTION
THIS PROJECT CONSISTS OF IMPROVING A DRY POND WITH AN EXISTING OUTLET STRUCTURE AND A 24" REINFORCED CONCRETE PIPE BY CONVERTING INTO CONSTRUCTED WETLANDS.

EXISTING SITE CONDITIONS
THE EXISTING SITE IS AN EXISTING DRY POND WITH SLOPED DROP INLET OUTLET STRUCTURE AND A 24" REINFORCED CONCRETE OUTLET PIPE.

ADJACENT PROPERTIES
THIS PROJECT IS IN THE INTERIOR OF THE STONEHOUSE ELEMENTARY SCHOOL PROPERTY. THE SITE IS BORDERED TO THE SOUTH BY A SCHOOL FIELD, TO THE EAST BY THE SCHOOL PARKING LOT, AND TO THE NORTH AND THE WEST BY WOODED AREAS.

OFF SITE
THERE WILL BE NO AREAS OF OFFSITE WORK ASSOCIATED WITH THIS PROJECT.

SOILS
IN THE AREA OF CONSTRUCTION THE SOILS CONSIST OF 11C CRAVEN-UCHEE COMPLEX AND 19B KEMPSVILLE-EMPORIA FINE SAND LOAM.

CRITICAL EROSION AREAS
THERE ARE AREAS OF IMPACTS TO 25% OR GREATER SLOPES. THEY ARE SHOWN IN THE ENVIRONMENTAL INVENTORY PLAN BELOW.

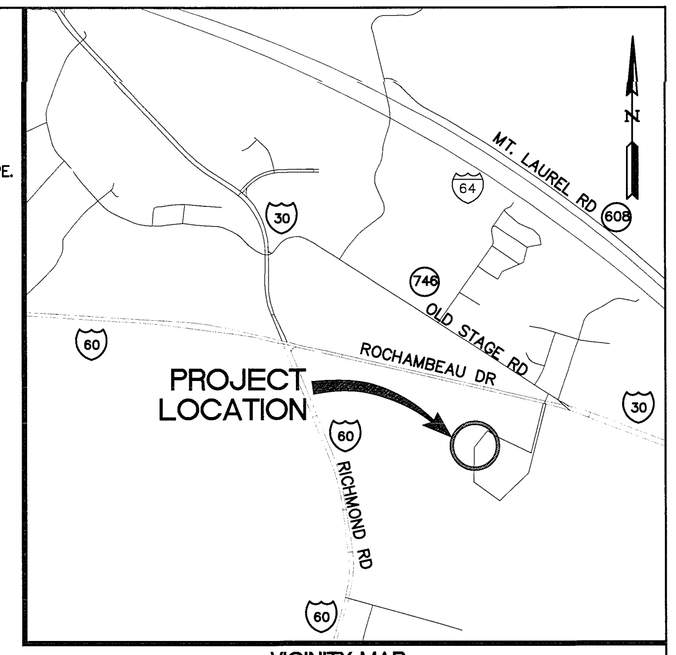
EROSION AND SEDIMENT CONTROL MEASURES
UNLESS OTHERWISE INDICATED, ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSTALLED IN ACCORDANCE WITH THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK (VESCH). THE MINIMUM STANDARDS OF THE VESCH SHALL BE ADHERED TO UNLESS OTHERWISE WAIVED OR APPROVED BY THE ON-SITE E&S CONTROL INSPECTOR. THESE MEASURES SHALL INCLUDE ROCK CHECK DAMS, SILT FENCE, TREE PROTECTION, AND PERMANENT SEEDING.

MANAGEMENT STRATEGIES
1. CONSTRUCTION SHALL BE SEQUENCED SUCH THAT GRADING OPERATIONS CAN BEGIN AND END AS QUICKLY AS POSSIBLE.
2. E&S CONTROL DEVICES SHALL BE INSTALLED PRIOR TO COMMENCING LAND DISTURBING ACTIVITIES.
3. TEMPORARY SEEDING OR OTHER STABILIZATION SHALL FOLLOW IMMEDIATELY AFTER GRADING.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE INSTALLATION, INSPECTION, AND MAINTENANCE OF ALL E&S CONTROL MEASURES.
5. THE CONTRACTOR SHALL CLEAN ALL EXISTING PAVEMENT/GRASS AREAS OF SEDIMENT AND DEBRIS AS NECESSARY AS A RESULT OF CONSTRUCTION ACTIVITIES.

PERMANENT STABILIZATION
FOLLOWING FINISH GRADING, SEEDING SHALL BE IN ACCORDANCE WITH THE VESCH. ALL DISTURBED AREAS SHALL BE STABILIZED WITH PERMANENT SEEDING IMMEDIATELY.

MAINTENANCE
ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE CHECKED ROUTINELY AND AFTER EACH SIGNIFICANT RAINFALL EVENT TO INSURE THAT THEY ARE OPERATING EFFECTIVELY. ALL MEASURES SHALL BE MAINTAINED IN ACCORDANCE WITH THE VESCH.

CONSTRUCTION SEQUENCE
1. PRIOR TO OBTAINING LAND DISTURBING PERMIT, THE CONTRACTOR SHALL OBTAIN A VSMP PERMIT (VIRGINIA STORMWATER MANAGEMENT PROGRAM) FROM DCR (VIRGINIA DEPARTMENT OF CONSERVATION AND RECREATION).
2. THE CONTRACTOR SHALL SCHEDULE A PRE-CONSTRUCTION MEETING WITH THE JAMES CITY COUNTY DEPARTMENT OF GENERAL SERVICES PRIOR TO BEGINNING ANY WORK AT THE SITE.
3. CONTACT "MISS UTILITY" FOR PUBLIC SERVICES.
4. INSTALL EROSION AND SEDIMENT CONTROL DEVICES.
5. CLEAR DEBRIS AND SEDIMENT BUILD-UP FROM EXISTING OUTLET STRUCTURE AS WELL AS FROM THE EXISTING PIPE OUTFALL.
6. INSTALL 24" OUTFALL PIPE, INLETS, MANHOLE, AND DRAINAGE CHANNEL.
7. REPAIR OUTLET STRUCTURE AND PIPE AS SHOWN IN PLANS, RESEALING JOINTS, INSTALLING ANTI-SEEP COLLAR, RECONSTRUCTING INLET, AND CONSTRUCTING DAM EMBANKMENT.
8. CONVERT POND TO CONSTRUCTED WETLANDS AS SHOWN IN THE PLANS.
9. ALL DISTURBED EARTH SHALL BE FINE GRADED, TOPSOILED (WITH AT LEAST 4" OF TOPSOIL) AND PERMANENTLY SEEDED.
10. REMOVE ALL EROSION AND SEDIMENT CONTROL MEASURES WITHIN THIRTY DAYS OF FINAL SITE STABILIZATION, BUT ONLY AFTER APPROVAL IS OBTAINED FROM THE ASSIGNED JAMES CITY COUNTY ENGINEER OR INSPECTOR.



VICINITY MAP
SCALE: 1"=2000'

JCC-SP-0032-2012

Environmental Division
SEP 30 2013
RECEIVED

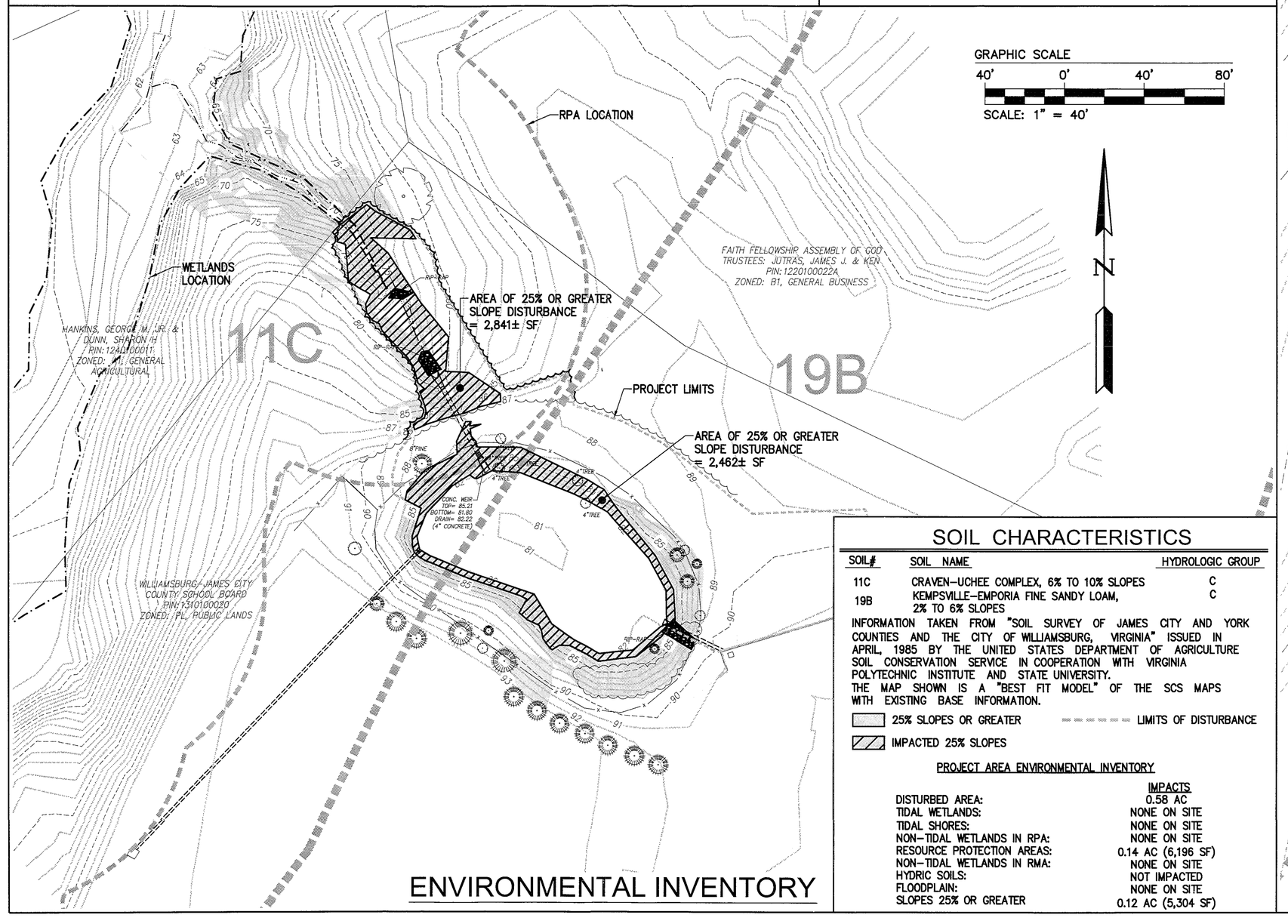
COUNTY OF JAMES CITY
FINAL SITE PLAN

APPROVALS	DATE
Fire Dept. SB,JC	5/31/13
Health Dept.	
VDOT CMJ	7/8/13
Planning	
Environ. STJR	6/27/13
Zoning Adm. JSP	7/9/13
JCSA CS,JC	5/14/13
County Eng.	
REA	
Other	

Rev.	Date	Description	Revised By
3	06/10/13	REVISED PER COUNTY COMMENTS	REC
2	9/24/12	REVISED PER COUNTY COMMENTS	REC
1	7/20/12	REVISED PER COUNTY COMMENTS	REC

PLANNING DIVISION
JUN 17 2013
RECEIVED

COMMONWEALTH OF VIRGINIA
ROBERT E. BARNETT III
Lic. No. 35664
PROFESSIONAL ENGINEER
06/10/2013



ENVIRONMENTAL INVENTORY

SOIL CHARACTERISTICS

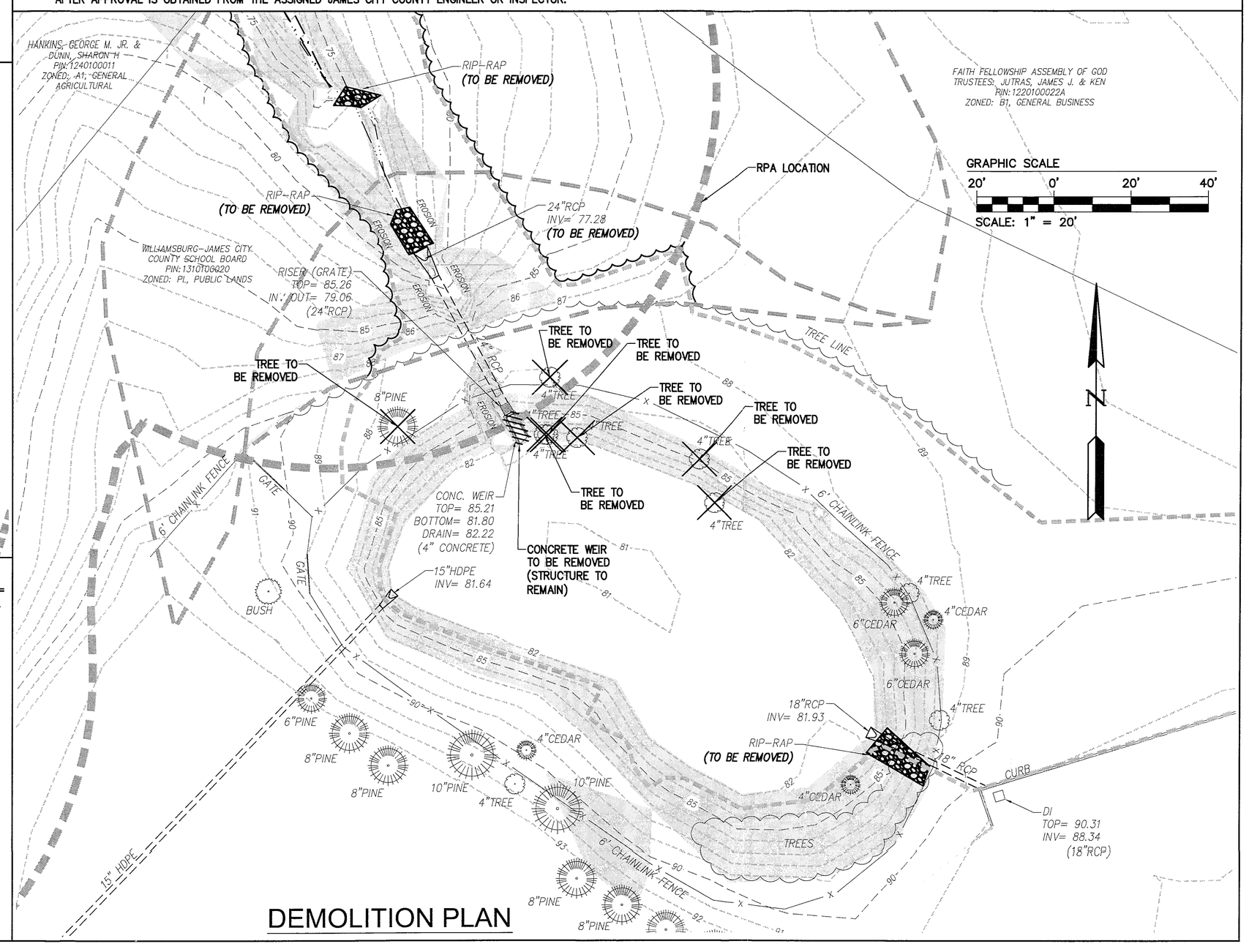
SOIL #	SOIL NAME	HYDROLOGIC GROUP
11C	CRAVEN-UCHEE COMPLEX, 6% TO 10% SLOPES	C
19B	KEMPSVILLE-EMPORIA FINE SANDY LOAM, 2% TO 6% SLOPES	C

INFORMATION TAKEN FROM "SOIL SURVEY OF JAMES CITY AND YORK COUNTIES AND THE CITY OF WILLIAMSBURG, VIRGINIA" ISSUED IN APRIL, 1985 BY THE UNITED STATES DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE IN COOPERATION WITH VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY.
THE MAP SHOWN IS A "BEST FIT MODEL" OF THE SCS MAPS WITH EXISTING BASE INFORMATION.

25% SLOPES OR GREATER — LIMITS OF DISTURBANCE
IMPACTED 25% SLOPES

PROJECT AREA ENVIRONMENTAL INVENTORY

	IMPACTS
DISTURBED AREA:	0.58 AC
TIDAL WETLANDS:	NONE ON SITE
TIDAL SHORES:	NONE ON SITE
NON-TIDAL WETLANDS IN RPA:	NONE ON SITE
RESOURCE PROTECTION AREAS:	0.14 AC (6,196 SF)
NON-TIDAL WETLANDS IN RMA:	NONE ON SITE
HYDRIC SOILS:	NOT IMPACTED
FLOODPLAIN:	NONE ON SITE
SLOPES 25% OR GREATER	0.12 AC (5,304 SF)



DEMOLITION PLAN

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Williamsburg, Virginia 23188
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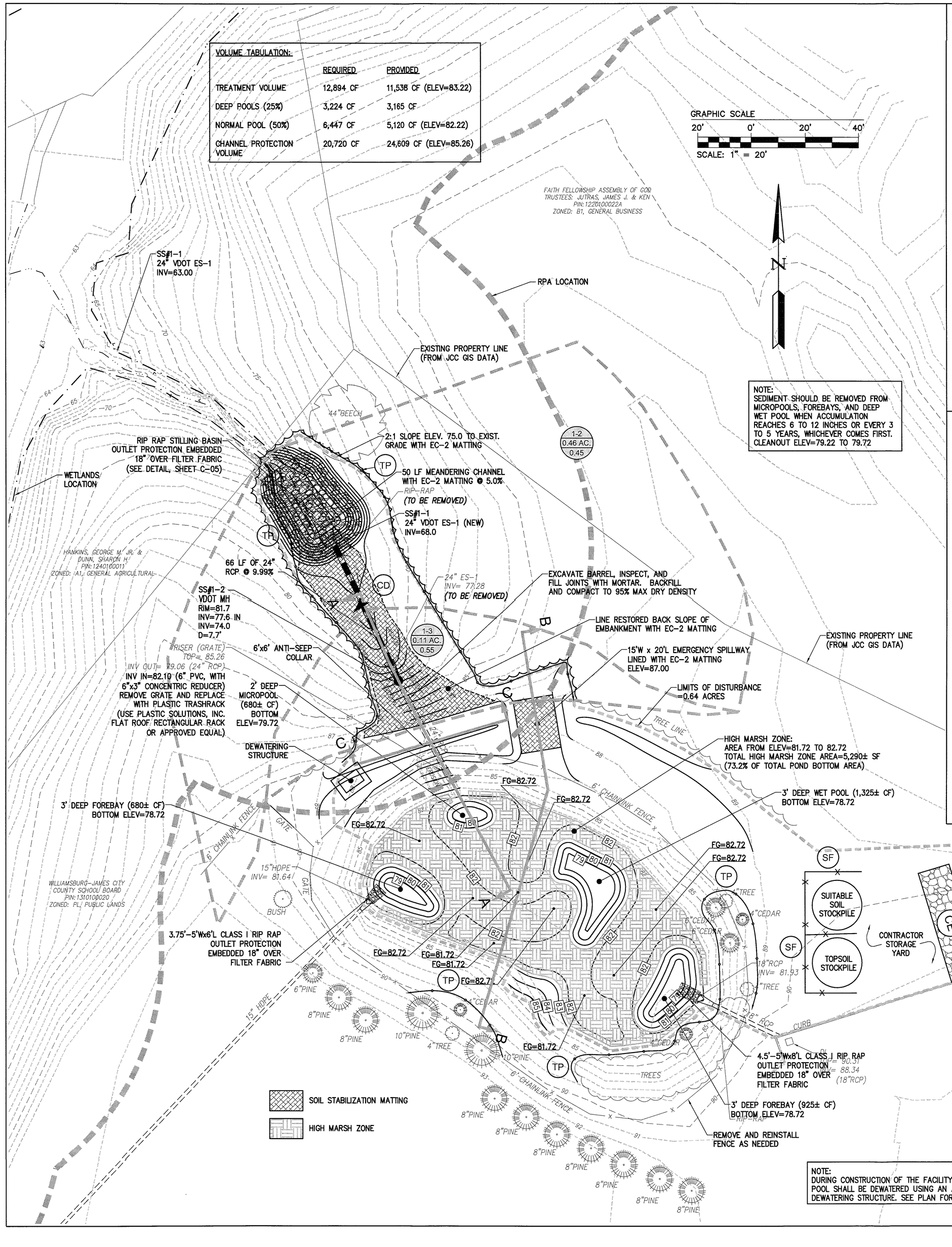
Fax: (757) 220-8994
www.aesva.com
Hampton Roads | Central Virginia | Middle Peninsula

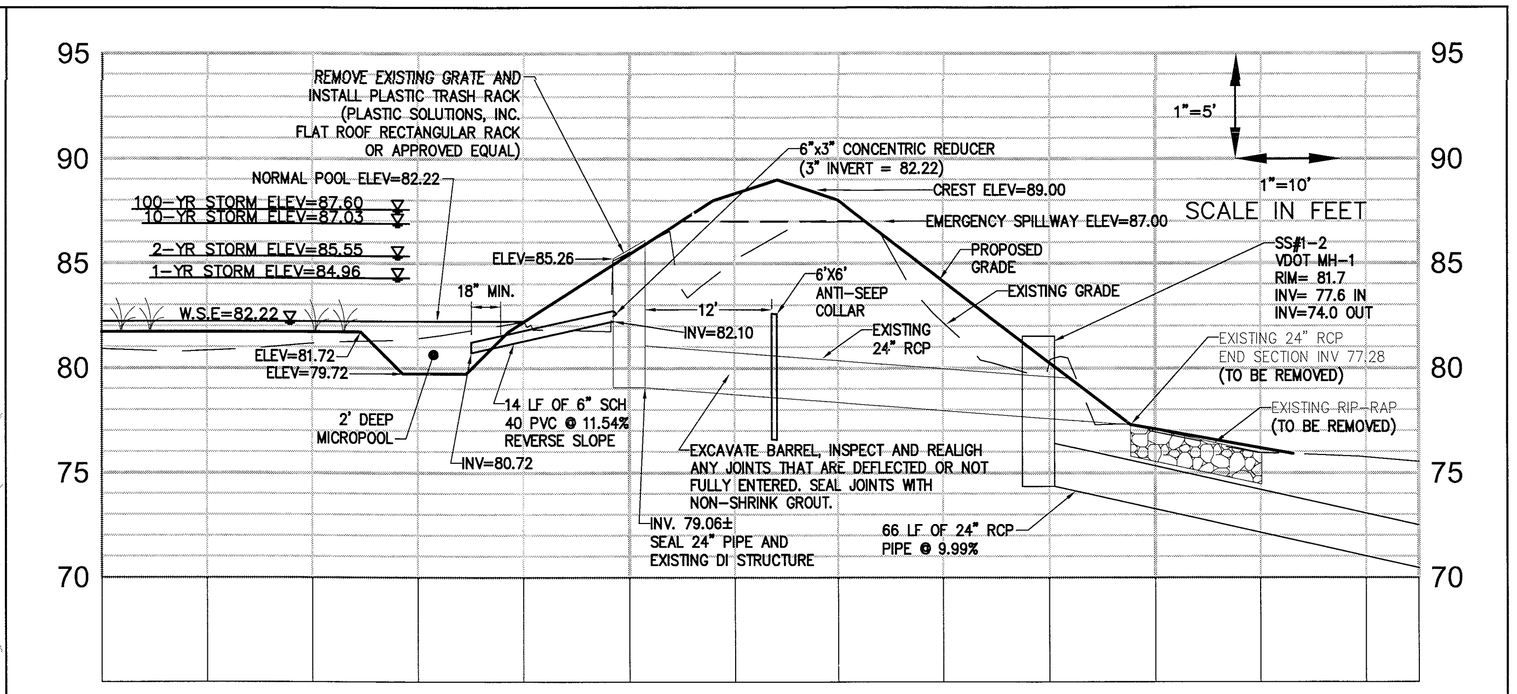
STONEHOUSE ELEMENTARY
STORMWATER FACILITY REPAIR/RETROFIT
STONEHOUSE DISTRICT JAMES CITY COUNTY VIRGINIA

Project Contacts:	REC
Project Number:	W10119-E-04
Scale: AS SHOWN	Date: 4/17/12

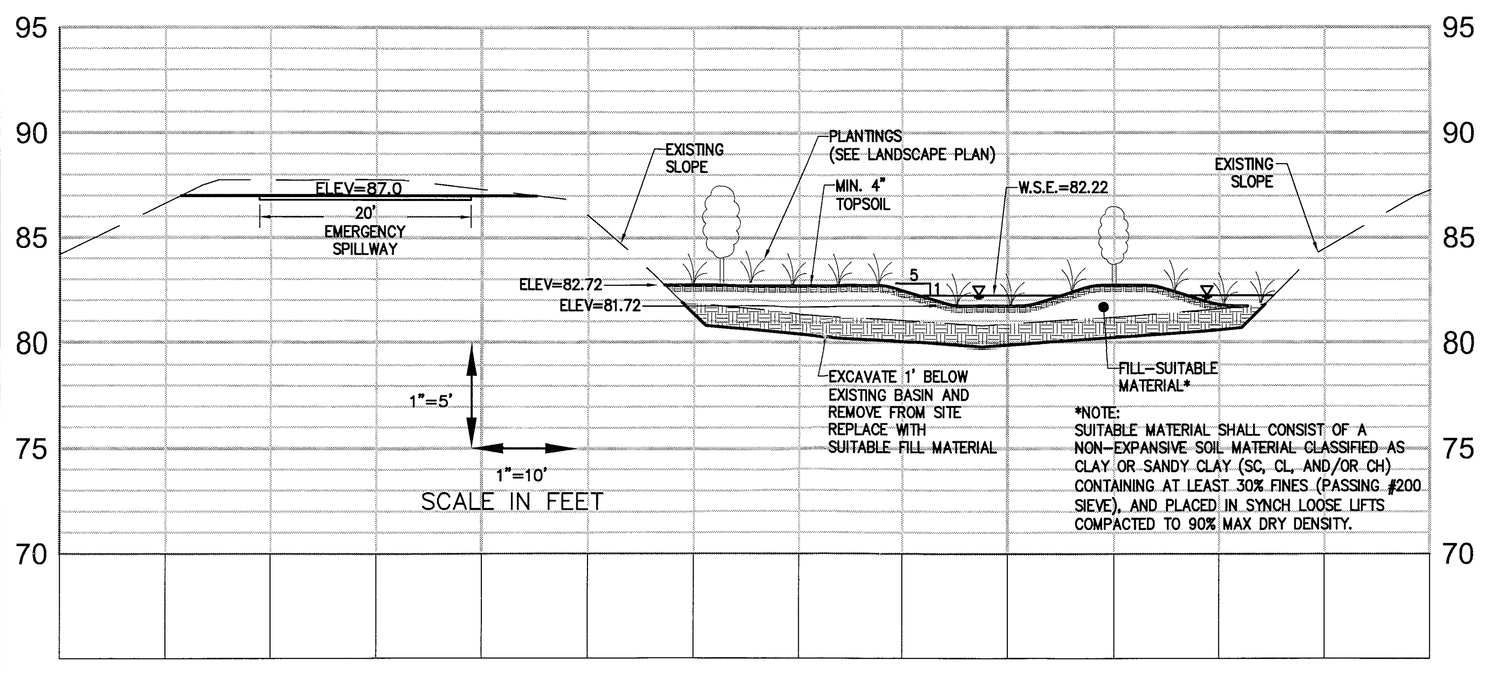
Sheet Title:
TITLE SHEET, DEMO PLAN, & ENVIRONMENTAL INVENTORY

Sheet Number
1

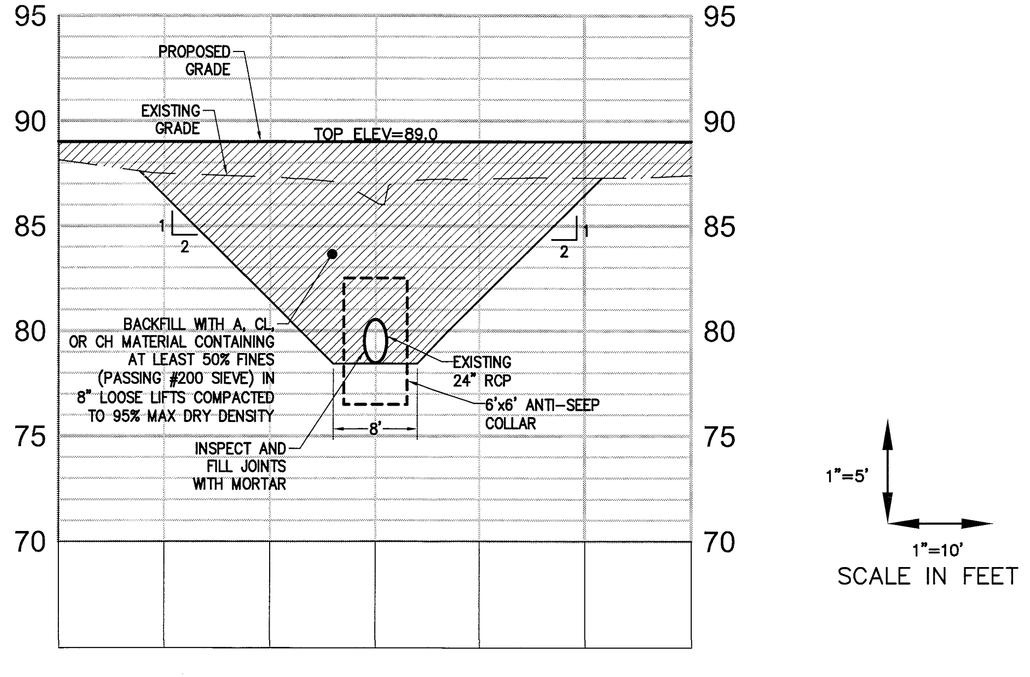




EMBANKMENT CROSS-SECTION A-A



EMBANKMENT CROSS-SECTION B-B



EMBANKMENT CROSS-SECTION C-C

Rev.	Date	Description	Revised By
3	06/10/13	REVISED PER COUNTY COMMENTS	REC
2	9/24/12	REVISED PER COUNTY COMMENTS	REC
1	7/20/12	REVISED PER COUNTY COMMENTS	REC

COMMONWEALTH OF VIRGINIA
ROBERT E. COSBY III
Lic. No. 35664
PROFESSIONAL ENGINEER
06/10/2013

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STONEHOUSE ELEMENTARY
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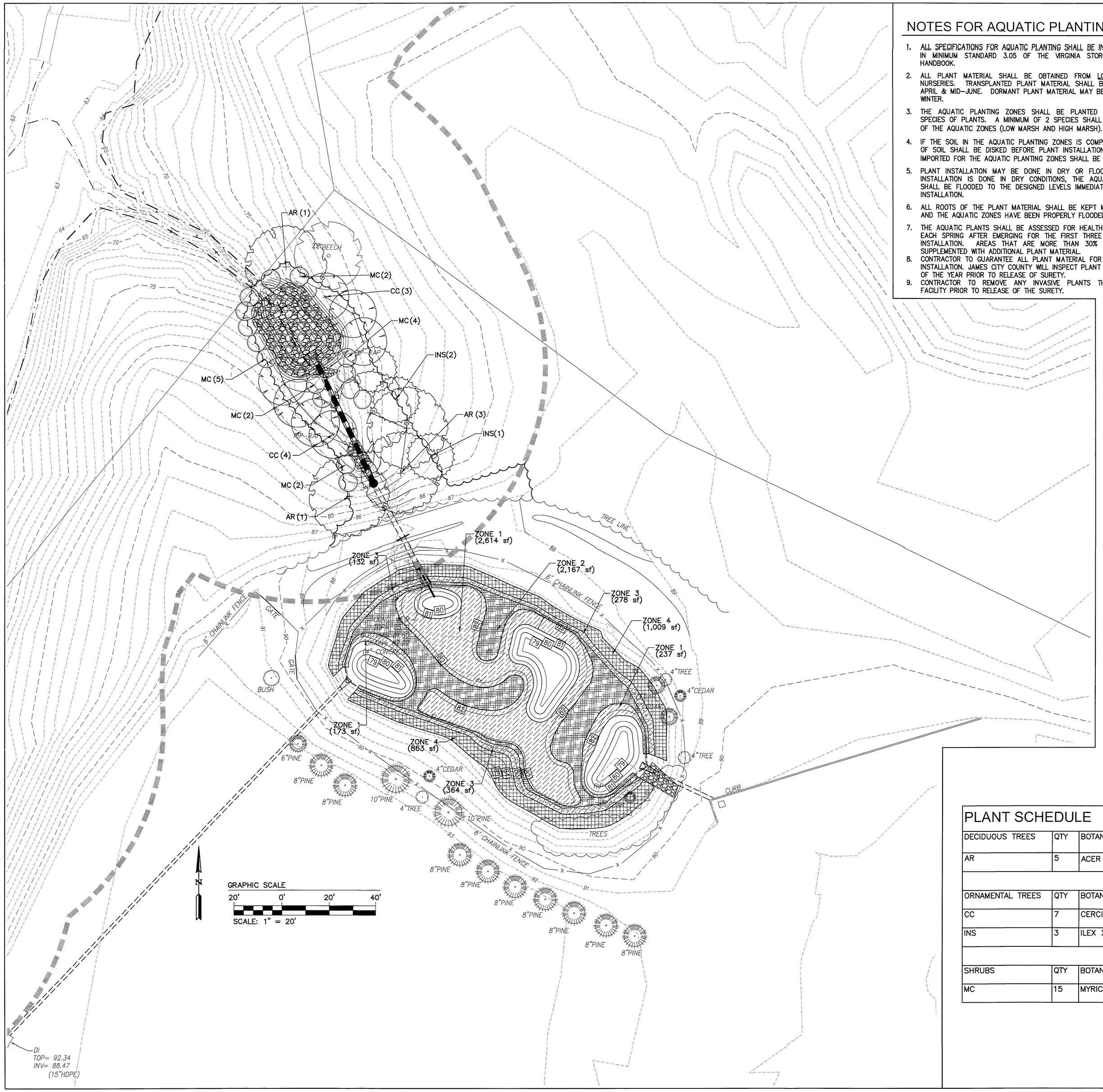
STONEHOUSE DISTRICT | JAMES CITY COUNTY | VIRGINIA

Project Contacts:	REC
Project Number:	W10119-E-04
Scale: AS SHOWN	Date: 4/17/12

Sheet Title:
GRADING AND EROSION & SEDIMENT CONTROL PLAN

Sheet Number
2



NOTES FOR AQUATIC PLANTING AREAS:

1. ALL SPECIFICATIONS FOR AQUATIC PLANTING SHALL BE INSTALLED AS SPECIFIED IN MINIMUM STANDARD 3.05 OF THE VIRGINIA STORMWATER MANAGEMENT HANDBOOK.
2. ALL PLANT MATERIAL SHALL BE OBTAINED FROM LOCAL AQUATIC PLANT NURSERIES. TRANSPLANTED PLANT MATERIAL SHALL BE INSTALLED BETWEEN APRIL & MID–JUNE. DORMANT PLANT MATERIAL MAY BE PLANTED IN FALL OR WINTER.
3. THE AQUATIC PLANTING ZONES SHALL BE PLANTED WITH AT LEAST 5–7 SPECIES OF PLANTS. A MINIMUM OF 2 SPECIES SHALL BE PLANTED IN EACH OF THE AQUATIC ZONES (LOW MARSH AND HIGH MARSH).
4. IF THE SOIL IN THE AQUATIC PLANTING ZONES IS COMPACTED, THE UPPER 6" OF SOIL SHALL BE DISKED BEFORE PLANT INSTALLATION. ANY SOIL THAT IS IMPORTED FOR THE AQUATIC PLANTING ZONES SHALL BE A MINIMUM 4" DEEP.
5. PLANT INSTALLATION MAY BE DONE IN DRY OR FLOODED CONDITIONS. IF INSTALLATION IS DONE IN DRY CONDITIONS, THE AQUATIC PLANTING ZONES SHALL BE FLOODED TO THE DESIGNED LEVELS IMMEDIATELY FOLLOWING PLANT INSTALLATION.
6. ALL ROOTS OF THE PLANT MATERIAL SHALL BE KEPT MOIST UNTIL INSTALLED AND THE AQUATIC ZONES HAVE BEEN PROPERLY FLOODED.
7. THE AQUATIC PLANTS SHALL BE ASSESSED FOR HEALTH AND AREA COVERAGE EACH SPRING AFTER EMERGING FOR THE FIRST THREE YEARS AFTER INITIAL INSTALLATION. AREAS THAT ARE MORE THAN 30% DEFICIENT SHOULD BE SUPPLEMENTED WITH ADDITIONAL PLANT MATERIAL.
8. CONTRACTOR TO GUARANTEE ALL PLANT MATERIAL FOR ONE YEAR FOLLOWING INSTALLATION. JAMES CITY COUNTY WILL INSPECT PLANT MATERIAL AT THE END OF THE YEAR PRIOR TO RELEASE OF SURETY.
9. CONTRACTOR TO REMOVE ANY INVASIVE PLANTS THAT COLONIZE WITHIN FACILITY PRIOR TO RELEASE OF THE SURETY.

AQUATIC PLANT SCHEDULE

	ZONE 1	3,024 SF
	(6"–12" WATER DEPTH) – PLANT SIZE: 2" PLUGS 25% AREA COVERAGE AT INSTALLATION)	
	LEMNA MINOR / DUCKWEED 5% @ 18" OC	78
	NUPHAR LUTEA / SPATTERDOCK 5% @ 18" OC	78
	PELTANDRA VIRGINICA / ARROW ARUM 5% @ 18" OC	78
	SAGITTARIA LANCIFOLIA / DUCK POTATO 5% @ 18" OC	78
	VALLISNERIA AMERICANA / WILD CELERY 5% @ 18" OC	78
	ZONE 2	2,167 SF
	(0"–6" WATER DEPTH) – PLANT SIZE: 2" PLUGS 25% AREA COVERAGE AT INSTALLATION)	
	EUPATORIUM PURPUREUM / SAVANNAH JOE–PYE WEED 5% @ 12" OC	126
	POLYGONUM PUNCTATUM / SMARTWEED 5% @ 12" OC	126
	SAURURUS CERNUUS / LIZARD'S TAIL 5% @ 12" OC	126
	SCIRPUS PUNGENS / THREE SQUARE BULRUSH 5% @ 12" OC	126
	ZIZANIA AQUATICA / ANNUAL WILD RICE 5% @ 12" OC	126
	ZONE 3	774 SF
	(0"–12" ABOVE POOL) – PLANT SIZE: 2" PLUGS 25% AREA COVERAGE AT INSTALLATION)	
	ACORUS CALAMUS / SWEET FLAG 5% @ 12" OC	45
	CAREX AQUATILIS / WATER SEDGE 5% @ 12" OC	45
	EUPATORIUM MACULATUM / JOE PYE WEED 5% @ 12" OC	45
	PANICUM VIRGATUM / SWITCH GRASS 5% @ 18" OC	20
	SPARGANIUM AMERICANUM / BUR–REED 5% @ 12" OC	45
	ZONE 4	1,872 SF
	(12"–36" ABOVE POOL) – PLANT SIZE: 2" PLUGS 25% AREA COVERAGE AT INSTALLATION)	
	ANDROPOGON VIRGINICUS / BROOMSEDGE BLUESTEM 5% @ 18" OC	49
	HIBISCUS MOSCHEUTOS / ROSE MALLOW 5% @ 18" OC	49
	LOBELIA CARDINALIS / CARDINAL FLOWER 5% @ 18" OC	49
	PANICUM VIRGATUM / SWITCH GRASS 5% @ 18" OC	49
	SCIRPUS CYPERINUS / WOOL GRASS 5% @ 18" OC	49

NOTE: EACH SPECIES OF PLANT SHALL BE PLACED IN A "CLUSTER" OF 8–12 PLANTS. THOSE SPECIES "CLUSTERS" SHALL BE EVENLY DISTRIBUTED THROUGHOUT THEIR RELATIVE AQUATIC PLANT ZONE.

PLANT SCHEDULE

DECIDUOUS TREES	QTY	BOTANICAL NAME	COMMON NAME	SIZE	ROOT	REMARKS
AR	5	ACER RUBRUM 'RED SUNSET'	RED SUNSET MAPLE	2–1/2" CAL.	B & B	SINGLE STEM
ORNAMENTAL TREES	QTY	BOTANICAL NAME	COMMON NAME	SIZE	ROOT	REMARKS
CC	7	CERCIS CANADENSIS	EASTERN REDBUD	8' HT.	B & B	SINGLE STEM
INS	3	ILEX X NELLIE R. STEVENS	NELLIE R. STEVENS HOLLY	8' HT.	B & B	SINGLE STEM
SHRUBS	QTY	BOTANICAL NAME	COMMON NAME	SIZE	ROOT	REMARKS
MC	15	MYRICA CERIFERA	WAX MYRTLE	18" HT./W	CONT.	DENSE, FULL

Rev.	Date	Description	Revised by
3	08/10/13	REVISED PER COUNTY COMMENTS	REC
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1	7/20/12	REVISED PER COUNTY COMMENTS	REC

COMMONWEALTH OF VIRGINIA
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STONEHOUSE ELEMENTARY
STORMWATER FACILITY REPAIR/RETROFIT
STONEHOUSE DISTRICT | JAMES CITY COUNTY | VIRGINIA

Project Contacts:	REC
Project Number:	W10119-E-04
Scale: 1"=20'	Date: 4/17/12

Sheet Title:
LANDSCAPE PLAN

Sheet Number
3

JAMES CITY COUNTY ENVIRONMENTAL DIVISION
STANDARD EROSION AND SEDIMENT CONTROL NOTES
REVISED OCTOBER 1, 2009

THE FOLLOWING STANDARD EROSION AND SEDIMENT CONTROL (E&SC) NOTES SHALL BECOME PART OF APPROVED EROSION AND SEDIMENT CONTROL PLANS FOR ALL PLAN OF DEVELOPMENT PROJECTS IN JAMES CITY COUNTY, VIRGINIA.

1. ALL THE PROVISIONS OF VIRGINIA EROSION AND SEDIMENT CONTROL LAW AND REGULATIONS, MINIMUM STANDARDS, HANDBOOKS, AND TECHNICAL BULLETINS AS PUBLISHED BY THE VIRGINIA SOIL & WATER CONSERVATION BOARD AND/OR THE VIRGINIA DEPARTMENT OF CONSERVATION AND RECREATION, DIVISION OF SOIL & WATER CONSERVATION SHALL APPLY TO THE PROJECT.

2. MINIMUM STANDARDS # 1 THROUGH # 19 OF THE VIRGINIA EROSION AND SEDIMENT CONTROL REGULATIONS (4VAC50–30–40) SHALL APPLY TO THE PROJECT.

3. THE OWNER OR APPLICANT SHALL BE RESPONSIBLE TO REGISTER FOR COVERAGE UNDER THE GENERAL PERMIT FOR DISCHARGE OF STORMWATER FROM CONSTRUCTION ACTIVITIES, IN ACCORDANCE WITH CURRENT REQUIREMENTS OF THE VIRGINIA STORMWATER MANAGEMENT PROGRAM (VSMP) AND THE VIRGINIA DEPARTMENT OF CONSERVATION AND RECREATION.

4. THE OWNER OR APPLICANT SHALL PROVIDE THE NAME OF AN INDIVIDUAL HOLDING A VALID RESPONSIBLE LAND DISTURBER (RLD) CERTIFICATE OF COMPETENCE WHO WILL BE RESPONSIBLE FOR THE LAND–DISTURBING ACTIVITY PRIOR TO ENGAGING IN THE LAND–DISTURBING ACTIVITY. THIS WILL BE NECESSARY PRIOR TO ISSUANCE OF A LAND–DISTURBING PERMIT FOR THE PROJECT. THE RLD IS REQUIRED TO ATTEND THE PRECONSTRUCTION CONFERENCE FOR THE PROJECT.

5. THE CONTRACTOR IS RESPONSIBLE TO CONTACT MISS UTILITY (DIAL 811 IN VA OR 1–800–552–7001) PRIOR TO ANY UTILITY OR SITE WORK EXCAVATIONS.

6. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE PLANNED, DESIGNED, IMPLEMENTED, INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE PROVISIONS OF THE LATEST EDITION OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK (VESCH). THE CONTRACTOR SHALL MAINTAIN, INSPECT AND REPAIR ALL EROSION AND SEDIMENT CONTROL MEASURES AS NEEDED THROUGHOUT THE LIFE OF THE PROJECT TO ENSURE CONTINUED ACCEPTABLE PERFORMANCE.

7. A PRECONSTRUCTION CONFERENCE (MEETING) SHALL BE HELD ON SITE BETWEEN THE COUNTY ENVIRONMENTAL DIVISION, THE OWNER–APPLICANT, THE RESPONSIBLE LAND–DISTURBER (RLD), THE CONTRACTOR AND OTHER RESPONSIBLE AGENCIES, AS APPLICABLE, PRIOR TO ISSUANCE OF A LAND–DISTURBING PERMIT. THE OWNER OR APPLICANT IS REQUIRED TO COORDINATE SCHEDULING OF THE PRECONSTRUCTION CONFERENCE BETWEEN ALL APPLICABLE PARTIES. THE CONTRACTOR SHALL SUBMIT A SEQUENCE OF CONSTRUCTION TO THE COUNTY ENVIRONMENTAL DIVISION FOR REVIEW AND APPROVAL PRIOR TO THE PRECONSTRUCTION MEETING.

8. ALL PERIMETER EROSION AND SEDIMENT CONTROL MEASURES SHALL BE CONSTRUCTED AS A FIRST STEP IN ANY LAND–DISTURBING ACTIVITY AND SHALL BE MADE FUNCTIONAL BEFORE UPSLOPE LAND DISTURBANCE TAKES PLACE.

9. ADDITIONAL SAFETY FENCE OR DUST CONTROL MEASURES, IN ACCORDANCE WITH THE PROVISIONS OF MINIMUM STANDARDS & SPECS. 3.01 AND 3.39 OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK (VESCH), MAY BE REQUIRED TO BE IMPLEMENTED IN ADDITION TO THAT SHOWN ON THE APPROVED PLAN IN ORDER TO ENSURE ADEQUATE PROTECTION OF THE HEALTH, SAFETY AND WELFARE OF THE PUBLIC OR IF SITE CONDITIONS CHANGE, BECOME APPARENT OR ALTER SIGNIFICANTLY FOLLOWING THE DATE OF PLAN APPROVAL.

10. EROSION AND SEDIMENT CONTROL MEASURES MAY REQUIRE MINOR FIELD ADJUSTMENTS AT OR FOLLOWING TIME OF CONSTRUCTION TO ENSURE THEIR INTENDED PURPOSE IS ACCOMPLISHED, TO ENSURE ADEQUATE PROTECTION OF THE HEALTH, SAFETY AND WELFARE OF THE PUBLIC, OR IF SITE CONDITIONS CHANGE, BECOME APPARENT OR ALTER SIGNIFICANTLY FOLLOWING THE DATE OF PLAN APPROVAL. COUNTY ENVIRONMENTAL DIVISION APPROVAL SHALL BE REQUIRED FOR ANY DEVIATION OF EROSION AND SEDIMENT CONTROL MEASURES FROM THE APPROVED PLAN.

11. OFF–SITE WASTE OR BORROW AREAS SHALL BE APPROVED BY THE COUNTY ENVIRONMENTAL DIVISION PRIOR TO THE IMPORT OF ANY BORROW OR EXPORT OF ANY WASTE TO OR FROM THE PROJECT SITE.

12. CULVERT AND STORM DRAIN INLET PROTECTIONS, IN ACCORDANCE WITH THE PROVISIONS OF MINIMUM STANDARDS & SPECS. 3.07 & 3.08 OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK (VESCH), MAY BE REMOVED AT THE DISCRETION OF THE ASSIGNED COUNTY ENVIRONMENTAL DIVISION INSPECTOR SHOULD PLACEMENT OF THE MEASURE RESULT IN EXCESSIVE ROAD FLOODING OR TRAFFIC HAZARD OR RESULT IN THE REDIRECTION OF DRAINAGE ONTO OR TOWARD EXISTING LOTS, DRIVEWAYS OR STRUCTURES. DECISIONS SHALL BE MADE ON A CASE–BY–CASE BASIS BASED ON FIELD SITUATIONS ENCOUNTERED.

13. DRAINAGE FACILITIES SHALL BE INSTALLED AND FUNCTIONAL WITHIN 30 DAYS FOLLOWING COMPLETION OF ROUGH GRADING AT ANY POINT WITHIN THE PROJECT.

14. NO MORE THAN 300 FEET OF TRENCH MAY BE OPEN AT ONE TIME FOR UNDERGROUND UTILITY LINES, INCLUDING STORM WATER CONVEYANCES. ALL OTHER PROVISIONS OF MINIMUM STANDARD # 16 OF THE VIRGINIA EROSION AND SEDIMENT CONTROL REGULATIONS APPLY.

15. IF DISTURBED AREA STABILIZATION IS TO BE ACCOMPLISHED DURING THE MONTHS OF DECEMBER, JANUARY OR FEBRUARY, STABILIZATION SHALL CONSIST OF MULCHING IN ACCORDANCE WITH MINIMUM STANDARD & SPEC. 3.35 OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK (VESCH). SEEDING WILL THEN TAKE PLACE AS SOON AS THE SEASON PERMITS.

16. THE TERM SEEDING, FINAL VEGETATIVE COVER OR STABILIZATION ON THE APPROVED PLAN SHALL MEAN THE SUCCESSFUL GERMINATION AND ESTABLISHMENT OF A STABLE GRASS COVER FROM A PROPERLY PREPARED SEEDBED, IN ACCORDANCE WITH MINIMUM STANDARDS & SPECS. 3.29 THROUGH 3.37 OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK (VESCH), AS APPLICABLE. IRRIGATION, IF NECESSARY, SHALL COMPLY WITH ALL APPLICABLE OUTDOOR WATER USE RESTRICTIONS OF THE JAMES CITY SERVICE AUTHORITY.

17. TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHALL NOT BE REMOVED UNTIL ALL DISTURBED AREAS ARE STABILIZED. REMOVAL SHALL NOT OCCUR WITHOUT AUTHORIZATION BY THE COUNTY ENVIRONMENTAL DIVISION. DISTURBANCES ASSOCIATED WITH THE REMOVAL OF TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHALL BE PROPERLY STABILIZED.

18. NO SEDIMENT TRAP OR SEDIMENT BASIN SHALL BE REMOVED UNTIL A) AT LEAST 75 PERCENT OF THE SINGLE–FAMILY LOTS WITHIN THE DRAINAGE AREA TO THE TRAP OR BASIN HAVE BEEN SOLD TO A THIRD PARTY FOR THE CONSTRUCTION OF HOMES (UNRELATED TO THE DEVELOPER); AND/OR, B) 60 PERCENT OF THE SINGLE–FAMILY LOTS WITHIN THE DRAINAGE AREA TO THE TRAP OR BASIN ARE COMPLETED AND STABILIZED. A BULK SALE OF THE LOTS TO ANOTHER BUILDER DOES NOT SATISFY THIS PROVISION. SEDIMENT TRAPS AND SEDIMENT BASINS SHALL NOT BE REMOVED WITHOUT AUTHORIZATION OF THE COUNTY ENVIRONMENTAL DIVISION.

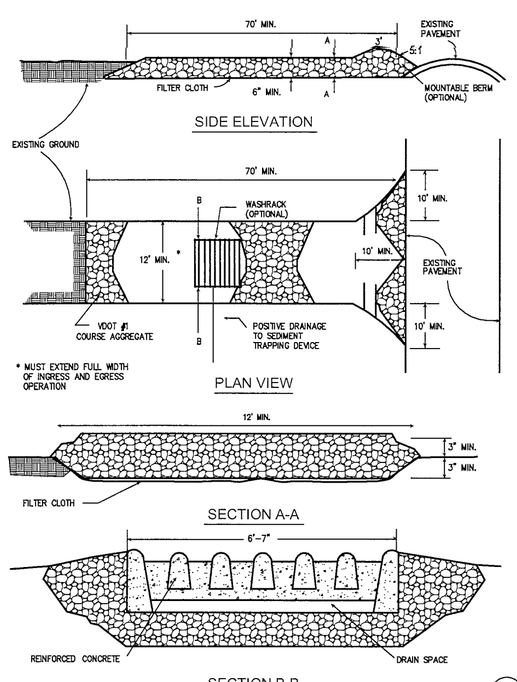
19. APPLICABLE PROVISIONS OF THE COUNTY BMP MANUAL (JAMES CITY COUNTY GUIDELINES FOR DESIGN AND CONSTRUCTION OF STORMWATER MANAGEMENT BMPS) AND THE VIRGINIA STORMWATER MANAGEMENT HANDBOOK (VSMH) APPLY TO THE PROJECT.

20. DESIGN AND CONSTRUCTION OF PRIVATE–TYPE STORM DRAINAGE SYSTEMS, OUTSIDE VDOT RIGHT–OF–WAY, SHALL BE PERFORMED IN ACCORDANCE WITH THE CURRENT VERSION OF THE JAMES CITY COUNTY ENVIRONMENTAL DIVISION, STORMWATER DRAINAGE CONVEYANCE SYSTEMS (NON–BMP RELATED), GENERAL DESIGN AND CONSTRUCTION GUIDELINES.

21. RECORD DRAWINGS (ASBUILTS) AND CONSTRUCTION CERTIFICATIONS ARE REQUIRED FOR ALL STORMWATER FACILITIES INCLUDING STORMWATER MANAGEMENT/BMP FACILITIES AND STORM DRAINAGE CONVEYANCE SYSTEMS. RECORD DRAWINGS AND CONSTRUCTION CERTIFICATIONS MUST MEET ESTABLISHED PROGRAM REQUIREMENTS OF BOTH THE COUNTY ENVIRONMENTAL AND STORMWATER DIVISIONS.

22. ALL STORMWATER FACILITIES INCLUDING BMPS, STORM DRAINAGE PIPES, STORMWATER CONVEYANCES, INLETS, MANHOLES, OUTFALLS AND ROADSIDE AND OTHER OPEN CHANNELS SHALL BE INSPECTED BY THE COUNTY STORMWATER DIVISION AND GEOTECHNICAL ENGINEER IN ACCORDANCE WITH ESTABLISHED COUNTY STORMWATER DIVISION PROGRAM REQUIREMENTS.

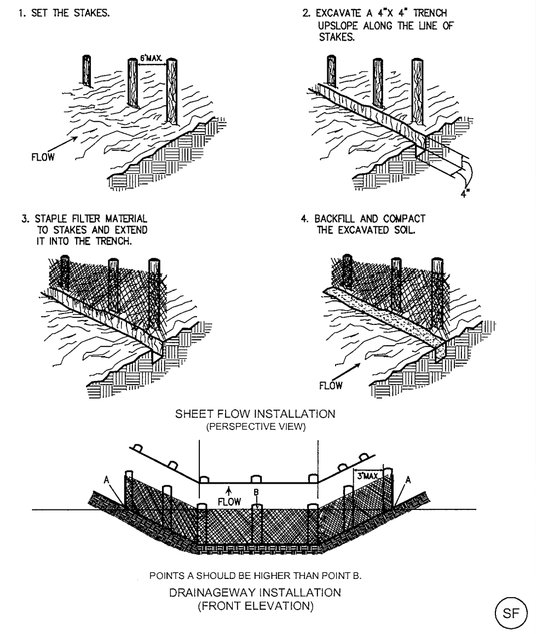
STONE CONSTRUCTION ENTRANCE



CE

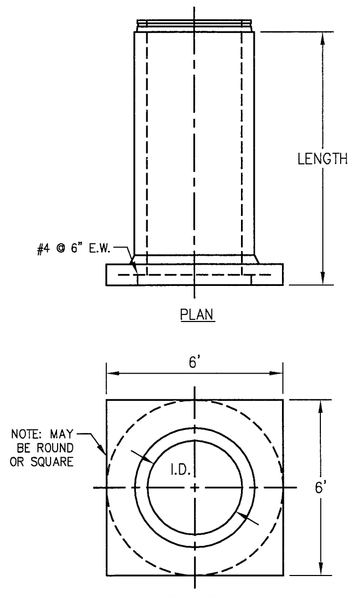
Plate 3.02-1

CONSTRUCTION OF A SILT FENCE (WITHOUT WIRE SUPPORT)



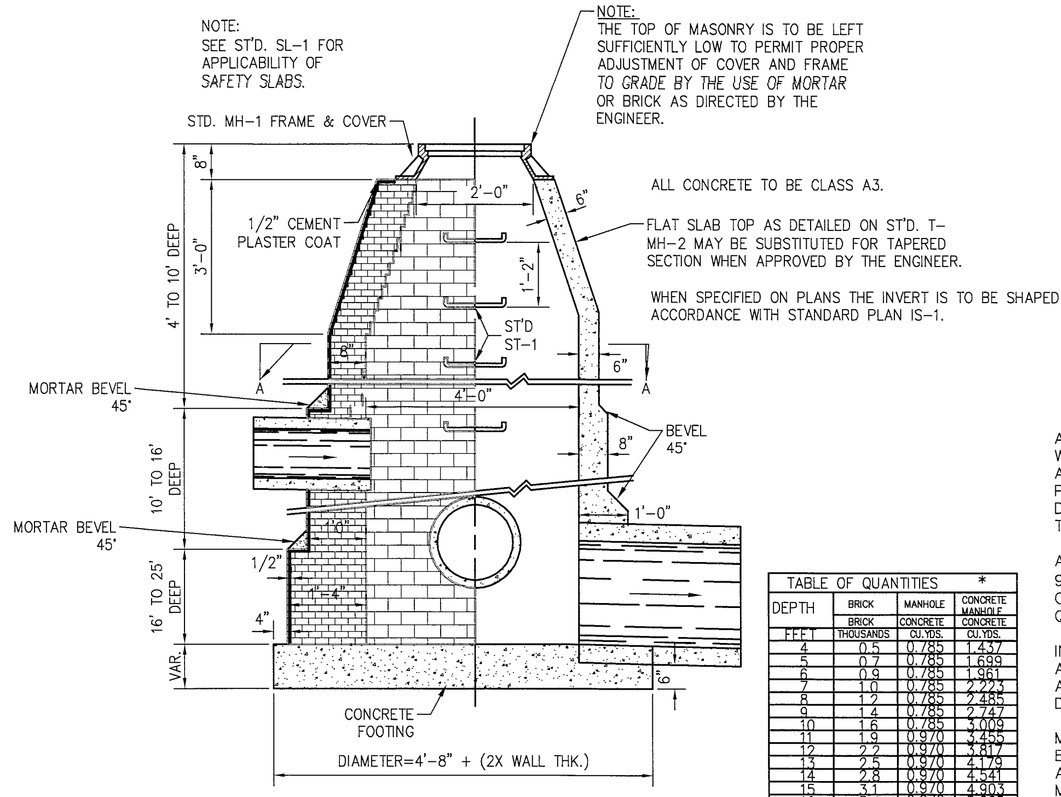
SF

Plate 3.05-2



PRE-CAST CONCRETE ANTI-SEEP COLLAR

N.T.S.



SECTION B-B
BRICK CONCRETE OR CONCRETE BLOCK

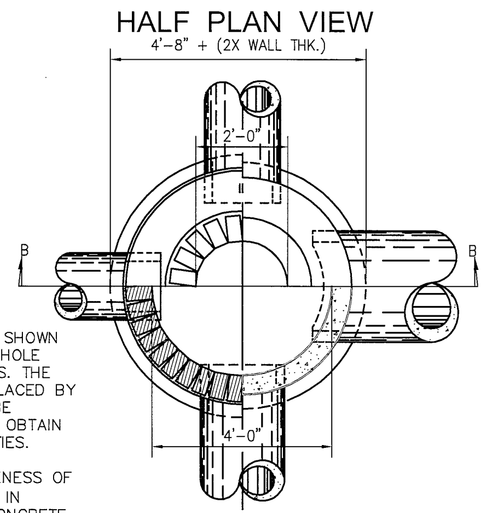
TABLE OF QUANTITIES			*
DEPTH	BRICK	MANHOLE	CONCRETE MANHOLE
	BRICK THOUSANDS	CONCRETE CU.YDS.	CONCRETE CU.YDS.
FEET			
4	0.5	0.765	1.437
5	0.7	0.765	1.689
6	0.9	0.765	1.961
7	1.0	0.765	2.223
8	1.2	0.765	2.485
9	1.4	0.765	2.747
10	1.6	0.765	3.009
11	1.9	0.870	3.455
12	2.2	0.870	3.817
13	2.5	0.870	4.179
14	2.8	0.870	4.541
15	3.1	0.870	4.903
16	3.4	0.870	5.265
17	4.0	1.113	6.032
INCREMENTS	0.45	———	0.582

QUANTITIES SHOWN ARE FOR MANHOLE WITHOUT PIPES. THE AMOUNT DISPLACED BY PIPES MUST BE DEDUCTED TO OBTAIN TRUE QUANTITIES.

A BASE THICKNESS OF 9" WAS USED IN COMPUTING CONCRETE QUANTITIES.

INCREMENTS TO BE ADDED FOR EACH ADDITIONAL FOOT OF DEPTH.

MATERIALS MAY BE BRICK, CONCRETE OR APPROVED CONCRETE MANHOLE BLOCK. IF BLOCKS ARE USED THE MINIMUM THICKNESS OF SAME IS TO BE 5". OTHER THICKNESSES ARE TO CONFORM TO WALL THICKNESS SHOWN FOR CONCRETE.



HALF-SECTION A-A
(WITH FRAME AND COVER REMOVED)
BRICK CONCRETE

MANHOLE FOR 12"-48" PIPE CULVERTS

N.T.S.

3	08/10/13	REVISED PER COUNTY COMMENTS	REC	
2	9/24/12	REVISED PER COUNTY COMMENTS	REC	
1	7/20/12	REVISED PER COUNTY COMMENTS	REC	
Rev.	Date	Description	Revised By	

COMMONWEALTH OF VIRGINIA — ROBERT E. COSBY III — Lic. No. 35664 — 06/10/2013 — PROFESSIONAL ENGINEER

8245 Old Towne Road, Suite 1
Williamsburg, VA 23188
Phone: (757) 253-0040
Fax: (757) 220-8894
www.aesva.com

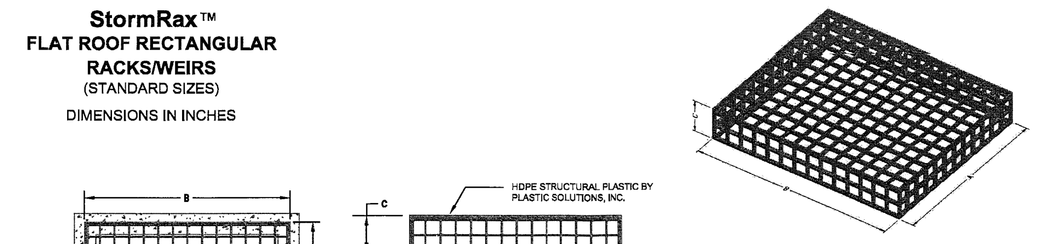
AES CONSULTING ENGINEERS
Hampton Roads | Central Virginia | Middle Peninsula

STONEHOUSE ELEMENTARY
STORMWATER FACILITY REPAIR/RETROFIT
STONEHOUSE DISTRICT — JAMES CITY COUNTY — VIRGINIA

Project Contacts:	REC
Project Number:	W10119-E-04
Scale: AS SHOWN	Date: 4/17/12
Sheet Title: NOTES & DETAILS	
Sheet Number	4

StormRax™ FLAT ROOF RECTANGULAR RACKS/WEIRS (STANDARD SIZES)

DIMENSIONS IN INCHES



PLAN VIEW SIDE VIEW

HOST STRUCTURE INFORMATION	
PART NUMBER	
LENGTH	
WIDTH	
WALL THICKNESS (REQ'D)	
OUTSIDE RADIUS (DIAMETER/2)	

AVAILABLE OPTIONS	
"L" CHANNEL STEEL CROSS BRACING	
REMOVABLE ACCESS HATCH	
HDPE ANTI-VORTEX PLATE	

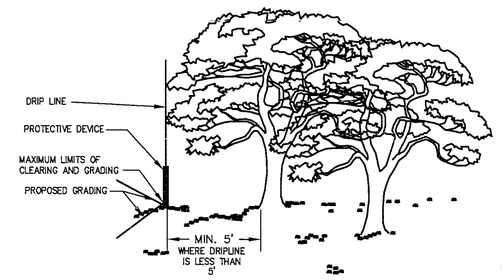
DIMENSION CODES (A,B,C)														
WIDTH (A)	11 3/4	16 3/8	22 3/4	27 3/8	33	38 3/8	43 3/4	49 3/4	54 5/8	60	65 3/4	70 3/4	76 3/4
CODE	02	03	04	05	06	07	08	09	10	11	12	13	14
LENGTH (B)	11 3/4	16 3/8	22 3/4	27 3/8	33	38 3/8	43 3/4	49 3/4	54 5/8	60	65 3/4	70 3/4	76 3/4
CODE	02	03	04	05	06	07	08	09	10	11	12	13	14
HEIGHT (C)	7 1/2	12 1/2											
CODE	01	02											
	1 GRID HIGH	2 GRIDS HIGH											

FLAT ROOF (FR) WIDTH (A) LENGTH (B) HEIGHT (C)

Plastic Solutions, Inc.
PO Box 4386, Winchester, VA 22604
238 McGhee Rd, Winchester, VA 22603
(877) 877-5727 phone
(540) 722-2219 fax
http://www.plastic-solution.com

CUSTOMER: | DATE:
PROJECT: | DRAWN BY:
APP'D BY:
DETAIL:

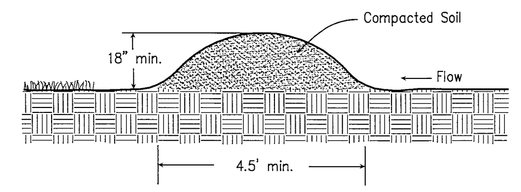
CONSTRUCTION OPERATIONS RELATIVE TO THE LOCATION OF PROTECTED TREES



TP

Plate 3.38-1

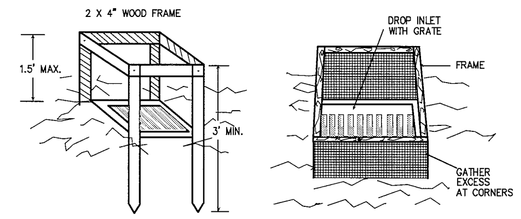
TEMPORARY DIVERSION DIKE



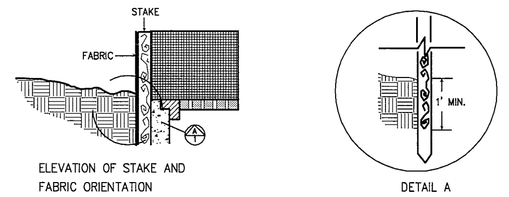
DD

Plate 3.09-1

SILT FENCE DROP INLET PROTECTION



PERSPECTIVE VIEWS



ELEVATION OF STAKE AND FABRIC ORIENTATION DETAIL A

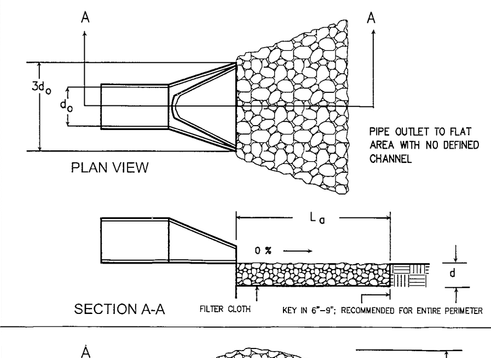
SPECIFIC APPLICATION

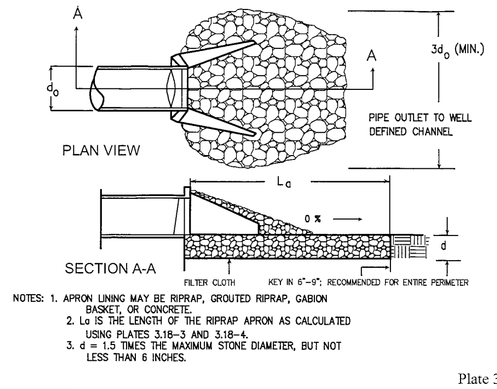
THIS METHOD OF INLET PROTECTION IS APPLICABLE WHERE THE INLET DRAINS A RELATIVELY FLAT AREA (SLOPE NO GREATER THAN 5%) WHERE THE INLET SHEET OR OVERLAND FLOWS (NOT EXCEEDING 1 C.F.S.) ARE TYPICAL. THE METHOD SHALL NOT APPLY TO INLETS RECEIVING CONCENTRATED FLOWS, SUCH AS IN STREET OR HIGHWAY MEDIANS.

IP

Plate 3.07-1

PIPE OUTLET CONDITIONS





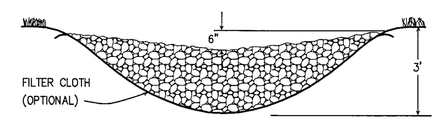
NOTES: 1. APRON LINING MAY BE RIPRAP, GROUTED RIPRAP, GABION BASKET, OR CONCRETE.
2. Lo IS THE LENGTH OF THE RIPRAP APRON AS CALCULATED USING PLATES 3.18-3 AND 3.18-4.
3. d = 1.5 TIMES THE MAXIMUM STONE DIAMETER, BUT NOT LESS THAN 6 INCHES.

OP

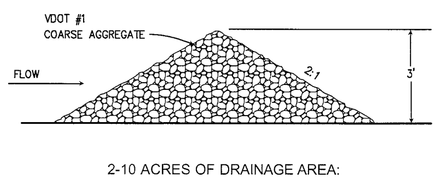
Plate 3.18-1

ROCK CHECK DAM

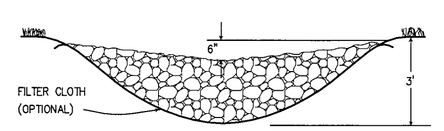
2 ACRES OR LESS OF DRAINAGE AREA:



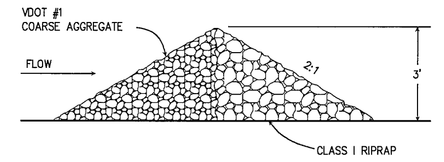
(DOWNSTREAM VIEW)



2-10 ACRES OF DRAINAGE AREA:



(DOWNSTREAM VIEW)

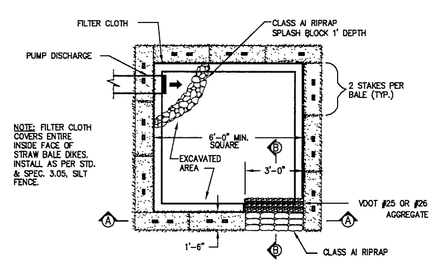


CD

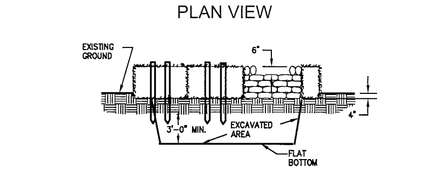
Plate 3.20-1

NOTE:
CONTRACTOR SHALL PROVIDE AS-BUILT DRAWINGS AND CONSTRUCTION CERTIFICATION IN ACCORDANCE WITH JAMES CITY COUNTY GUIDELINES.

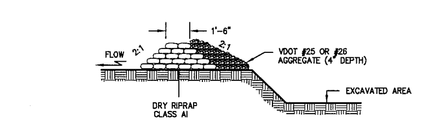
STRAW BALE/SILT FENCE PIT



PLAN VIEW



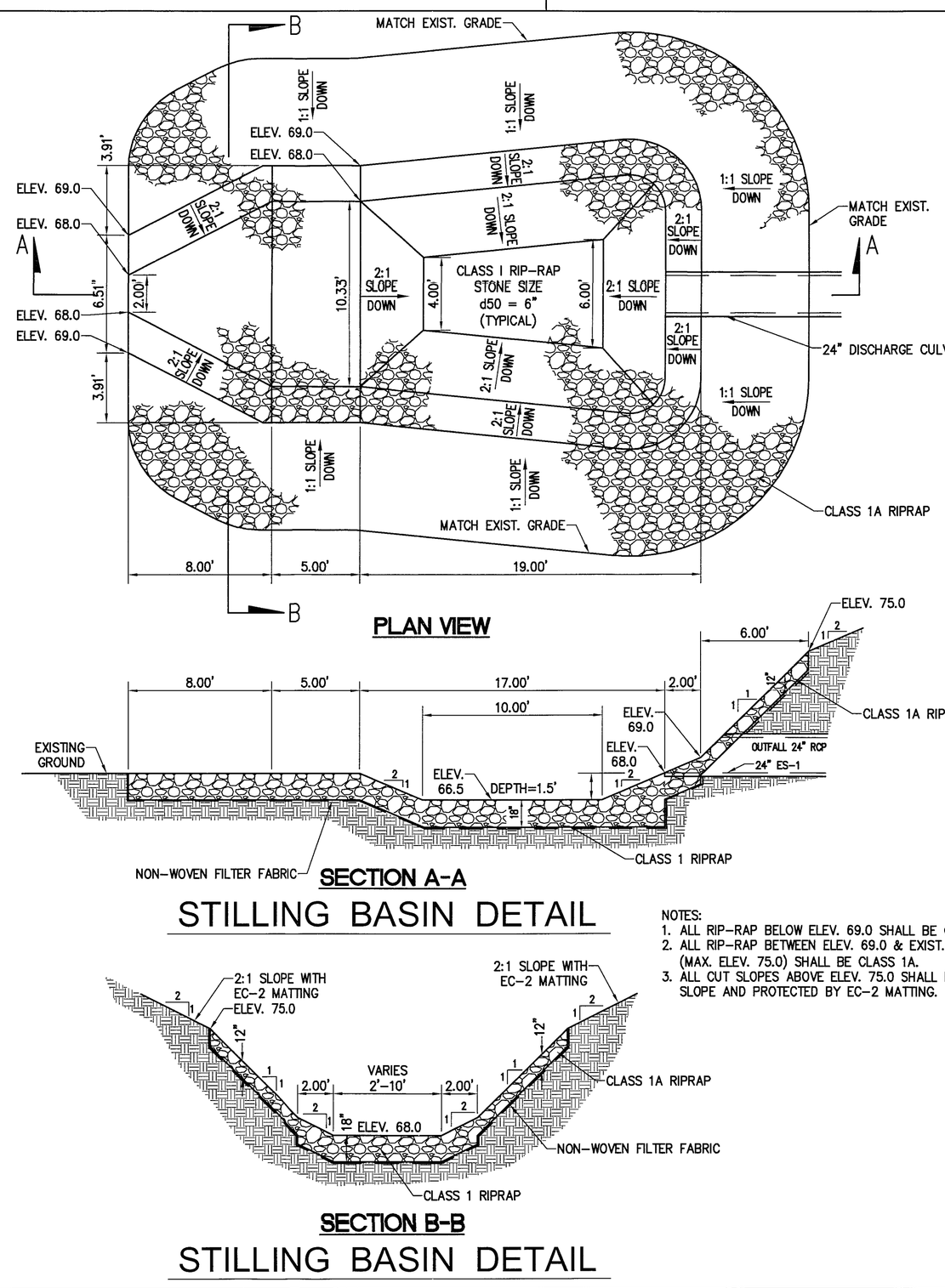
CROSS-SECTION A-A



CROSS-SECTION B-B

DS

Plate 3.26-3



NOTES:
1. ALL RIP-RAP BELOW ELEV. 69.0 SHALL BE CLASS 1.
2. ALL RIP-RAP BETWEEN ELEV. 69.0 & EXIST. GRADE (MAX. ELEV. 75.0) SHALL BE CLASS 1A.
3. ALL CUT SLOPES ABOVE ELEV. 75.0 SHALL BE 2:1 SLOPE AND PROTECTED BY EC-2 MATTING.

CONSTRUCTED WETLANDS MAINTENANCE PROGRAM & SCHEDULE

INSPECT AND REPAIR EROSION	BI-ANNUALLY
REMOVAL AND REPLACEMENT OF ALL DISEASED VEGETATION CONSIDERED BEYOND TREATMENT	WHENEVER NEEDED
CHECK FOR ACCUMULATED SEDIMENTS	BI-ANNUALLY
INSPECT AND REMOVE ANY DEBRIS THAT MAY COLLECT AT THE DROP INLET AND WITHIN FACILITY	AFTER MAJOR STORM EVENTS/OR SEMI ANNUALLY

A CONSTRUCTED STORMWATER WETLAND MAY BE MAINTAINED WITHOUT A PERMIT FROM THE U.S. ARMY CORPS OF ENGINEERS OR THE VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY (VA. DEQ).

ANY PRE-TREATMENT FACILITY OR DIVERSION STRUCTURE SHOULD BE INSPECTED AND MAINTAINED REGULARLY TO REMOVE FLOATABLES AND ANY LARGE DEBRIS. SEDIMENT SHOULD BE REMOVED FROM THE FOREBAY EVERY 3 TO 5 YEARS, OR WHEN 6 TO 12 INCHES HAVE ACCUMULATED, WHICHEVER COMES FIRST. TO CLEAN THE FOREBAY, DRAINING OR PUMPING AND A POSSIBLE TEMPORARY PARTIAL DRAWDOWN OF THE POOL AREA MAY BE REQUIRED. REFER TO THE VESCH, 1992 EDITION FOR PROPER DEWATERING METHODS. A PREDESIGNATED SPOIL AREA, AWAY FROM THE WETLANDS, SHOULD BE USED.

THE CONSTRUCTED STORMWATER WETLAND SHOULD BE INSPECTED AT LEAST TWICE A YEAR IN THE FIRST THREE YEARS AFTER CONSTRUCTION, DURING BOTH THE GROWING AND NON-GROWING SEASONS,FOR VEGETATIVE ESTABLISHMENT. INSPECTORS SHOULD DOCUMENT PLANT SPECIES DISTRIBUTION AND FATALITY RATES AND VERIFY COMPLIANCE WITH THE LANDSCAPING SPECIFICATIONS. ALSO, SEDIMENT ACCUMULATION, WATER ELEVATIONS, AND THE CONDITION OF THE OUTLET SHOULD BE DOCUMENTED. RECORDS SHOULD BE KEPT TO TRACK THE WETLAND'S HEALTH OVER TIME.

MANAGEMENT OF WETLAND VEGETATION

THE CONSTRUCTED WETLAND AND ITS BUFFER MAY NEED A REINFORCEMENT PLANTING AT THE ONSET OF THE SECOND GROWING SEASON AFTER CONSTRUCTION. THE SIZE AND SPECIES OF PLANTS TO BE USED SHOULD BE BASED ON THE GROWTH AND SURVIVAL RATE OF THE EXISTING PLANTS AT THE END OF THEIR FIRST GROWING SEASON. CONTROLLING THE GROWTH OF CERTAIN INVASIVE SPECIES, SUCH AS CATTAIL AND PHRAGMITES, MAY ALSO BE NECESSARY. THESE PLANTS CAN BE VERY HARD TO CONTAIN IF THEY ARE ALLOWED TO SPREAD UNCHECKED. THE BEST STRATEGY MAY BE TO DESIGN FOR A WIDE RANGE OF DISTINCT DEPTH ZONES.

RESEARCH SHOWS THAT FOR MOST AQUATIC PLANTS THE BULK OF THE POLLUTANTS IS STORED IN THE ROOTS, NOT THE STEMS AND LEAVES (LEPP 1981). THEREFORE, HARVESTING BEFORE WINTER DIEBACK IS UNNECESSARY. MANY UNANSWERED QUESTIONS REMAIN CONCERNING THE LONG-TERM POLLUTANT STORAGE CAPACITY OF PLANTS. ADDITIONAL PLANT MAINTENANCE RECOMMENDATIONS MAY BE PRESENTED IN THE FUTURE, AS SUCH INFORMATION BECOMES AVAILABLE.

THE EMBANKMENT AND BMP ACCESS ROAD SHOULD BE MOWED BIANNUALLY, AT A MAXIMUM, TO PREVENT THE GROWTH OF TREES. OTHERWISE, THE BUFFER AND UPLAND AREAS SHOULD BE ALLOWED TO GROW IN MEADOW CONDITIONS.

Rev.	Date	Description	Revised By
3	08/10/13	REVISED PER COUNTY COMMENTS	REC
2	9/24/12	REVISED PER COUNTY COMMENTS	REC
1	7/20/12	REVISED PER COUNTY COMMENTS	REC

COMMONWEALTH OF VIRGINIA ROBERT E. COSBY III Lic. No. 35664 06/10/2013 PROFESSIONAL ENGINEER

AES CONSULTING ENGINEERS
5248 Olde Towne Road, Suite 1
Williamsburg, VA 23188
Phone: (757) 253-0040
Fax: (757) 220-8994
www.aesva.com
Middle Peninsula | Central Virginia | Hampton Roads

STONEHOUSE ELEMENTARY
STORMWATER FACILITY REPAIR/RETROFIT
STONEHOUSE DISTRICT | JAMES CITY COUNTY | VIRGINIA

Project Contacts:	REC
Project Number:	W10119-E-04
Scale: AS SHOWN	Date: 4/17/12

Sheet Title: NOTES & DETAILS

Sheet Number 5

Stormwater Division

MEMORANDUM

DATE: July 28, 2014
TO: Michael J. Gillis, Virginia Correctional Enterprises Document Management Services
FROM: Jacob Smith, Stormwater Intern
PO: 110426
RE: Files Approved for Scanning

NAME PDF/SCANNED FILE:	**STONEHOUSE ELEMENTARY STORMWATER REPAIR AND RETROFIT**		
BMP ID OR GEN FILE NUMBER:	WC046	**OWNER NAME:**	WJCC SCHOOLS
PIN:	1310100020	**SITE ADDRESS:**	3651 ROCHAMBEAU DRIVE
		LEGAL DESCRIPTION:	STONEHOUSE ELEMENTARY;GEORGE M HANKINS ELEMENTARY SCHOOL #7 SITE

MAINTENANCE AGREEMENT IN FILE:	**N/A**	**BOOK/PAGE OR DOCUMENT NO.:**	**N/A**	**OTHER DESCRIPTION:**	N/A

BOX NO.:	2	**COMMENTS:**	TRANSMITTAL

TRANSMITTAL SHEET

ENGINEERING & RESOURCE PROTECTION → STORMWATER

Project: **Stonehouse Elementary Stormwater Repair & Retrofit**

County Plan No.: **SP-039-12**

Assigned BMP No: WC046

BMP Type: **Dry Pond**

Information Enclosed:

X Computations

X Other:

Name: **Tina Creech**

Date: **6/12/14**

Signature: Tina Creech

James City County Engineering and Resource Protection Division
Stormwater Management/BMP Record Drawing and Construction Certification Review Tracking Form

Project Name: Stonehouse Elementary Stormwater Repair & Retrofit
County Plan No. (List any amendments): SP-039-12
Stormwater Management Facility Type: Dry Pond
BMP Phase #: ☐ I ☐ II ☒ III

- ☑ Information Package Submittal Date: 4/28/14
- ☑ Completeness Check:
  - ☑ Record Drawing — Date/By: Cardinal Surveying 2/27/14
  - ☑ Construction Certification — Date/By: ECS 4/28/14
  - ☑ RD/CC Standard Forms — (Ensure that all forms for the BMP type are included)
  - ☒ Insp/Maint Agreement — # / Date: N/A
  - ☑ BMP Maintenance Plan — Location: Sheet #5 of SP-039-12
  - ☐ Special Considerations:
- ☑ Standard E&SC Notes on Approved Plan Requiring RD/CC or County comment in plan review
  - Location (sheet #): #4
- ☑ **County BMP ID Code #:** WC0460
- ☑ Log into Division's "As-Built Tracking Log"
- ☑ Obtain basic site information (GPIN, Owner, Address, etc.)
- ☑ Log into Access Database (BMP ID #, Plan No., GPIN, Project Name, etc.)
- ☑ Copy from Active Project File (correspondence, H&H, design computations, etc.).
- ☑ Create As-Built File using Project File information (File label, folder, copy plan/details/design information, etc.).
- ☑ Inspector Review of RD/CC (consult with Chief Engineer prior to completion of comments).
- ☑ Record Drawing Review against Approved Plan prior to Field Inspection.
- ☑ Final Site Inspection (FI) Performed — Date: 4/27/14
- ☑ Record Drawing (RD) Review — Date: 4/28/14
- ☑ Construction Certification (CC) Review — Date: 4/28/14
- ☑ Actions:
  - ☑ No comments.
  - ☐ Comments. Letter Forwarded. — Date:
  - ☐ Record Drawing (RD)
  - ☐ Construction Certification (CC)
  - ☐ Construction-Related (CR)
  - ☐ Site Issues (SI)
  - ☐ Other :
- ☐ Resubmittal (# and date):
- ☐ Re-inspection (if necessary):
- ☑ Drainage System Information Acceptable (RD/CC/System Info). Ok for bond release.
- ☑ Complete "Surety Request Form".
- ☑ Final Inspection of active file copying any relevant information to "As-Built" file.
- ☑ On County BMP Inventory (Phase I, II or III).
- ☑ Copy Final Inspection Report into County BMP Inspection Program file.
- ☑ Provide Digital Photographs of BMP and save into County BMP Inventory. → Maggie
- ☑ Request mylar/reproducible from As-Built plan preparer. CO
- ☑ Complete "As-built Tracking Log".
- ☑ Last check of BMP Access Database (County BMP Inventory).
- ☐ Add BMP to JCC Hydrology & Hydraulic database (optional).
- ☐ Add BMP to Municipal BMP list (if a County-owned facility)
- ☐ Add BMP to PRIDE BMP ratings database.

Final Sign-Off

Inspector: Dina Creed — Date: 6/12/14

Chief Engineer: Scott Thomas — Date: 06/16/14

*** See separate checklist, if needed.

Stormwater Management/BMP Facilities
Record Drawing and Construction Certification Forms

(Note: In accordance with the requirements of the Chesapeake Bay Preservation Ordinance, Chapter 23, Section 23-10(4), BMP's shall be designed and constructed in accordance with the manual entitled James City County Guidelines for Design and Construction of Stormwater Management BMP's. Erosion and sediment control policy and approved plans generally require that at the completion of the project and prior to release of surety, an "as-built" plan prepared by a registered Professional Engineer or Certified Land Surveyor must be provided for the drainage system for the project, including any Best Management Practice (BMP) facilities. In addition, for BMP facilities involving the construction of an impounding structure or dam embankment, certification is required by a Professional Engineer who has inspected the structure during its construction. Currently there are over 20 water quality type BMP's accepted by the County.)

Section 1 - Site Information:

Project Name: Stonehouse Elementary School Stormwater Facility Repair/Retrofit
Structure/BMP Name: WC046
Project Location: Stonehouse Elementary School
BMP Location: 3651 Rochambeau Drive (west side of school)
County Plan No.: SP-0039-2012

Project Type:
- ☐ Residential
- ☐ Commercial
- ☑ Institutional
- ☐ Public
- ☐ Other _____
- ☐ Business
- ☐ Office
- ☐ Industrial
- ☐ Roadway

Tax Map/Parcel No.: 1310100020
BMP ID Code (if known): WC046
Zoning District: Public Lands
Land Use: Elementary School
Site Area (sf or acres): 26.22 acres

Brief Description of Stormwater Management/BMP Facility:
The BMP is an existing dry detention facility that failed. This project involved rebuilding the dam and creating a constructed wetlands in the bottom of the basin with a micropool and berms to created extended flow paths for the stormwater in the basin.

Nearest Visible Landmark to SWM/BMP Facility: West side of the Stonehouse Elementary School

Nearest Vertical Ground Control (if known):

☐ JCC Geodetic Ground Control ☐ USGS ☐ Temporary ☐ Arbitrary ☐ Other

Station Number or Name:
Datum or Reference Elevation:
Control Description:
Control Location from Subject Facility:

Section 2 - Stormwater Management/BMP Facility Construction Information:

Pre-Construction Meeting Held for Construction of SWM/BMP Facility: ☑ Yes ☐ No ☐ Unknown
Approx. Construction Start Date for SWM/BMP Facility: October 2013
Facility Monitored by County Representative during Construction: ☑ Yes ☐ No ☐ Unknown
Name of Site Work Contractor Who Constructed Facility: JSG Corporation
Name of Professional Firm Who Routinely Monitored Construction: ECS Mid-Atlantic, LLC
Date of Completion for SWM/BMP Facility: November 9, 2013 (except for wetlands plantings)
Date of Record Drawing/Construction Certification Submittal: April 2014 (following wetland plantings)

(Note: Record Drawing and Construction Certifications are required within thirty (30) days of the completion of Stormwater Management and/or BMP facility construction. Record Drawings and Construction Certifications must be reviewed and approved by the James City County Engineering and Resource Protection Division prior to final inspection, acceptance and bond or surety release.)

Section 3 - Owner/Designer/Contractor Information:

Owner/Developer: *(Note: Site Owner or Applicant responsible for development of the project.)*

Name: James City County Stormwater Division (site owned by Wmbg-JCC School Board)
Mailing Address: 5320 Palmer Lane, Suite 2A
Williamsburg, VA 23188
Business Phone: 757-259-1442 Fax: 757-259-5833
Contact Person: Darryl Cook Title: Capital Projects Coordinator

Design Professional: *(Note: Professional Engineer or Certified Land Surveyor responsible for the design and preparation of plans and specifications for the Stormwater Management / BMP facility.)*

Firm Name: AES Consulting Engineers
Mailing Address: 5248 OldeTowne Road, Suite 1
Williamsburg, VA 23188
Business Phone: 757-253-0040
Fax: 757-220-8994
Responsible Plan Preparer: Bob Cosby
Title: Project Engineer
Plan Name: Stonehouse Elementary School Stormwater Facility Repair/Retrofit
Firm's Project No. W10119-E-04
Plan Date: 4/17/12 - final revision date 06/10/13
Sheet No.'s Applicable to SWM/BMP Facility: 1 thru 5 / _____ / _____ / _____ / _____

BMP Contractor: *(Note: Site Work Contractor directly responsible for construction of the Stormwater Management/BMP facility.)*

Firm Name: JSG Corporation
Mailing Address: PO Box 646
Lightfoot, VA 23090
Business Phone: 757-645-4870

Fax: 757-645-4860
Contact Person: Mike Mullins
Site Foreman/Supervisor: Mike Hubbard
Specialty Subcontractors and Purpose (for BMP Construction Only):
Shoreline Sensations - Wetlands plant installation (actually hired directly by James City County)

Section 4 - Professional Certifications:

Certifying Professionals: *(Note: A Registered Professional Engineer or Certified Land Surveyor is responsible for preparation of a Record Drawing, sometimes referred to as an As-Built plan, for the drainage system for the project including any Stormwater Management/BMP Facilities. A Registered Professional Engineer is responsible for the inspection, monitoring and certification of Stormwater Management / BMP facilities during its construction.)*

Record Drawing and Construction Certifications for Stormwater Management/BMP Facilities

Record Drawing Certification

Firm Name: Cardinal Surveying and Design
Mailing Address: 150 Strawberry Plains Road, Ste D
Williamsburg, VA 23188
Business Phone: 757-345-2866
Fax: 757-345-2877
Name: GEORGE M. CUNHA
Title: OWNER
Signature:
Date: 02-27-2014

I hereby certify to the best of my knowledge and belief that this record drawing represents the actual condition of the Stormwater Management/BMP facility. The facility appears to conform to the provisions of the approved design plan, specifications design, and stormwater management plan, except as specifically noted.

COMMONWEALTH OF VIRGINIA
GEORGE M. CUNHA
Lic. No. 002659
02-27-2014
LAND SURVEYOR

(Seal)

Virginia Registered Professional Engineer or Certified Land Surveyor

Construction Certification

Firm Name: ECS Mid-Atlantic, LLC
Mailing Address: 108 Ingram Road, Unit 1
Williamsburg, VA 23185
Business Phone: 757-229-6677
Fax: 757-342-1297
Name: B. Scott Gresham, P.E.
Title: Construction Services Manager
Signature:
Date: 4/28/14

I hereby certify to the best of my knowledge and belief that this Stormwater Management/BMP facility was monitored and constructed in accordance with the provisions of the approved plan, specifications, and stormwater management plan, except as specifically noted.

COMMONWEALTH OF VIRGINIA
4/28/14
B. SCOTT GRESHAM
Lic. No. 037785
PROFESSIONAL ENGINEER

(Seal)

Virginia Registered Professional Engineer

Section 5 - Record Drawing and Construction Certification Requirements and Instructions:

☑ Pre-Construction Meeting - Provides an opportunity to review SWM/BMP facility construction, maintenance and operation plans and addresses any questions regarding construction and/or monitoring of the structure. The design engineer, certifying professionals (if different), Owner/Applicant, Contractor and County representative(s) are encouraged to attend the preconstruction meeting. Advanced notice to the Engineering and Resource Protection Division is requested. Usually, this requirement can be met simultaneously with Erosion and Sediment Control preconstruction meetings held for the project.

☑ A fully completed ***STORMWATER MANAGEMENT / BMP FACILITIES, RECORD DRAWING and CONSTRUCTION CERTIFICATION FORM*** and ***RECORD DRAWING CHECKLIST***. All applicable sections shall be completed in their entirety and certification statements signed and sealed by the registered professional responsible for individual record drawing and/or construction certification.

☑ The Record Drawing shall be prepared by a Registered Professional Engineer or Certified Land Surveyor for the drainage system of the project including any Best Management Practices.

☑ Construction Certification - Construction of Stormwater Management / BMP facilities which contain impoundments, embankments and related engineered appurtenances including subgrade preparation, compacted soils, structural fills, liners, geosynthetics, filters, seepage controls, cutoffs, toe drains, hydraulic flow control structures, etc. shall be visually observed and monitored by a Registered Professional Engineer or his/her authorized representative. The Engineer must certify that the structure, embankment and associated appurtenances were built in accordance with the approved design plan, specifications and stormwater management plan and standard accepted construction practice and shall submit a written certification and/or drawings to the Engineering and Resource Protection Division as required. Soil and compaction test reports, concrete test reports, inspection reports, logs and other required construction material or installation documentation may be required by the Engineering and Resource Protection Division to substantiate the certification, if specifically requested. The Engineer shall have the authority and responsibility to make minor changes to the approved plan, in coordination with the assigned County inspector, in order to compensate for unsafe or unusual conditions encountered during construction such as those related to bedrock, soils, groundwater, topography, etc. as long as changes do not adversely affect the integrity of the structure(s). Major changes to the approved design plan or structure must be reviewed and approved by the original design professional and the James City County Environmental Division.

☑ Record Drawing and Construction Certifications are required within **thirty (30) days** of the completion of Stormwater Management / BMP facility construction. Submittals must be reviewed and accepted by James City County Engineering and Resource Protection Division prior to final inspection, acceptance and bond/surety release.

Dual Purpose Facilities - Completion of construction also includes an interim stage for Stormwater Management / BMP facilities which serve dual purpose as temporary sediment basins during construction and as permanent stormwater management / BMP facilities following construction, once development and stabilization are substantially complete. For these dual purpose facilities, construction certification is required once the temporary sediment basin phase of construction is complete. Final record drawing and construction certification of additional permanent components is required once permanent facility construction is complete.

Interim Construction Certification is required for those dual purpose embankment-type facilities that are generally ten (10) feet or greater in dam height (*) and may not be converted, modified or begin function as a permanent SWM / BMP structure for a period generally ranging from six (6) to eighteen (18) months or more from issuance of a Land Disturbance permit for construction.

Interim or final record drawing and construction certifications are not required for temporary sediment basins which are designed and constructed in accordance with current minimum standards and specifications for temporary sediment basins per the Virginia Erosion and Sediment Control Handbook (VESCH); have a temporary service life of less than eighteen (18) months; and will be removed completely once associated disturbed areas are stabilized, unless a distinct hazard to the public's health, safety and welfare is determined by the Engineering and Resource Protection Division due to the size or presence of the structure or due to evidence of improper construction.

(*Note: Dam Height as referenced above is generally defined as the vertical distance from the natural bed of the stream or waterway at the downstream toe of the embankment to the top of the embankment structure in accordance with 4VAC50-20-30, Virginia Impoundment Structure Regulations and the Virginia Dam Safety Program.)

☑ Record Drawings shall provide, at a minimum, all information as shown within these requirements and the attached **RECORD DRAWING CHECKLIST** specific to the type of SWM/BMP facility being constructed. Other additional record data may be formally requested by the James City County Engineering and Resource Protection Division. *(Note: Refer to the current edition of the James City County Guidelines for Design and Construction of Stormwater Management BMP's manual for a complete list of acceptable BMP's. Currently there are over 20 acceptable water quality type BMP's accepted by the County.)*

☑ Record Drawings shall consist of blue/black line prints and a reproducible (mylar, sepia, diazo, etc.) set of the approved stormwater management plan including applicable plan views, profiles, sections, details, maintenance plans, etc. as related to the subject SWM / BMP facility. The set shall indicate **"RECORD DRAWING "** in large text in the lower right hand corner of each sheet with record elevations, dimensions and data drawn in a clearly annotated format and/or boxed beside design values. Approved design plan values, dimensions and data shall not be removed or erased. Drawing sheet revision blocks shall be modified as required to indicate record drawing status. Elevations to the nearest 0.1' are sufficiently accurate except where higher accuracy is needed to show positive drainage. Certification statements as shown in Section 4 of the Record Drawing and Construction Certification Form, ***or similar forms thereof***, and professional signatures and seals, with dates matching that of the record drawing status in the revision or title block, are also required on all associated record drawing plans, prints or reproducibles.

☑ Submission Requirements - Initial and subsequent submissions for review shall consist of a minimum of one (1) blue/black line set for record drawings and one copy of the construction certification documents with appropriate transmittal. Under certain circumstances, it is understood that the record drawing and construction certification submissions may be performed by different professional firms. Therefore, record drawing submission may be in advance of construction certification or vice versa. Upon approval and prior to release of bond/surety, final submission shall include one (1) reproducible set of the record drawings, one (1) blue/black line set of the record drawings and one (1) copy of the construction certification. Also for current and/or future incorporation into the County BMP database and GIS system,

it is requested that the record drawings also be submitted to the Engineering and Resource Protection Division on a diskette or CD-ROM in an acceptable electronic file format such as *.dxf, *.dwg, etc. or in a standard scanned and readable format. The electronic file requirement can be discussed and coordinated with Engineering and Resource Protection Division staff at the time of final submission.

STORMWATER MANAGEMENT/BMP FACILITIES
RECORD DRAWING CHECKLIST

(Key for Checklist is as follows: XX Acceptable N/A Not Applicable Inc Incomplete)

I. Methods and Presentation: *(Required for all Stormwater Management/BMP facilities.)*

XX 1. All constructed facilities meet approved design plans, unless otherwise shown. Record information or deviations from approved design plan shown in clearly annotated format and/or boxed beside design values.

XX 2. Elevations to the nearest 0.1' unless higher accuracy is needed to show positive drainage.

XX 3. All plan sheets labeled with "RECORD DRAWING" in large text in lower right hand corner. (Approved County Plan Number and BMP ID Code can be included if known).

XX 4. All plan sheet revision blocks modified to indicate date and record drawing status.

XX 5. All plan sheets have certification statements and certifying professional's signature and seal.

II. Minimum Standards: *(Required for all Stormwater Management / BMP facilities, as applicable.)*

XX 1. All requirements of Section I (Methods and Presentation) apply to this section.

XX 2. Plan Views: Show general location, arrangement and dimensions. Location and alignment shall generally match approved design plans.

XX 3. Profile or elevations along top or berm of the facility. At a minimum, elevations are required at each end, at intervals not to exceed 50 feet and where low spots may be present. Top of embankment or berm elevations must be no less than design elevation plus any settlement allowances.

XX 4. Top widths, berm widths, and embankment side slopes.

XX 5. Show length, width and depth of facility or grading, contours or spot elevations as required to verify permanent pool and design storage volumes were met or were reasonably close to the approved design. Evaluation of as-built grading, contours, spot elevations, or cross-sections, may be necessary by the professional to ensure approved design configurations, depths and volumes were closely maintained. If grading or elevations are significantly different from the approved plan, the Engineering and Resource Protection Division shall be contacted immediately to determine whether the variation is acceptable or whether further evidence will be required. Facilities which do not closely resemble approved plan grades, elevations or configurations may require regrading by the Contractor; check volumetric computations; and/or a check hydraulic routing to ensure approved design water surface elevations, discharges or freeboard were closely maintained.

XX 6. Cross-section of the embankment through the principal spillway or outlet barrel. Must extend at least 100 ft. downstream of the pipe outlet or to recorded site property line, whichever is closer. Proper correlation is required between principal spillway (control structure) crest, emergency spillway crest, orifice, and weirs and the top of the dam or facility. All elevations and dimensions must reasonably match the design plan or be sequentially relative to each other and the facility must reflect the required design storage volume(s) and/or design depth.

XX 7. Profile or elevations along the entire centerline of the emergency spillway. Emergency spillway may be steeper, but no flatter or narrower than design.

XX 8. Elevation of the principal spillway crest or outlet crest of the structure.

XX 9. Primary control structure (riser) diameter or dimensions, height, type of material and base size. Indicate provisions for access that are present such as steps, ladders, etc.

XX 10. Dimensions, locations and elevations of outlet orifices, weirs, slots and drains.

XX 11. Type and size of anti-vortex and trash rack device. Height, diameter, dimensions, bar spacings (if applicable) and elevations relative to the principal spillway crest. Indicate if lockable hatch is present or not.

XX 12. Type, location, size, and number of anti-seep collars or documentation of other methods utilized for seepage control. **May need to obtain this information during construction.**

NA 13. Top of impervious core embankment, core trench limits and elevation of cut-off trench bottom. **May need to obtain this information during construction.**

XX 14. Elevation of the principal spillway barrel (outlet pipe) inlet and outlet invert.

XX 15. Outlet barrel diameter, length, slope, type, and thickness class of material and type of flared end sections, headwall or endwall.

XX 16. Outfall protection dimension, type and depth of rock and if underlain filter fabric is present.

XX 17. BMP interior and periphery landscaping zones conform with arrangements and requirements of the approved design plan.

NA 18. Maintenance plan taken from approved design plan transposed onto record drawing set.

XX 19. Fencing location and type, if applicable to facility.

XX 20. BMP vicinity properly cleaned of stockpiles and construction debris.

NA 21. No visual signs of erosion or channel degradation immediately downstream of facility.

NA 22. Any other information formally requested by the Environmental Division specific to the constructed SWM/BMP facility.

STORMWATER MANAGEMENT/BMP FACILITIES
RECORD DRAWING CHECKLIST

(Key for Checklist is as follows: XX Acceptable N/A Not Applicable Inc Incomplete)

IV. **Group B – Wetlands** *(Includes B-1 Shallow Marsh; B-2 Ext Det Shallow Wetlands; B-3 Pond Wetland System and B-4 Pocket Wetland)*

XX B1. Same requirements as Group A Wet Ponds.

XX B2. Minimum 2:1 length to width flow path provided across the facility.

XX B3. Micropool provided at or around outlet from BMP (generally 3 to 6 ft. deep).

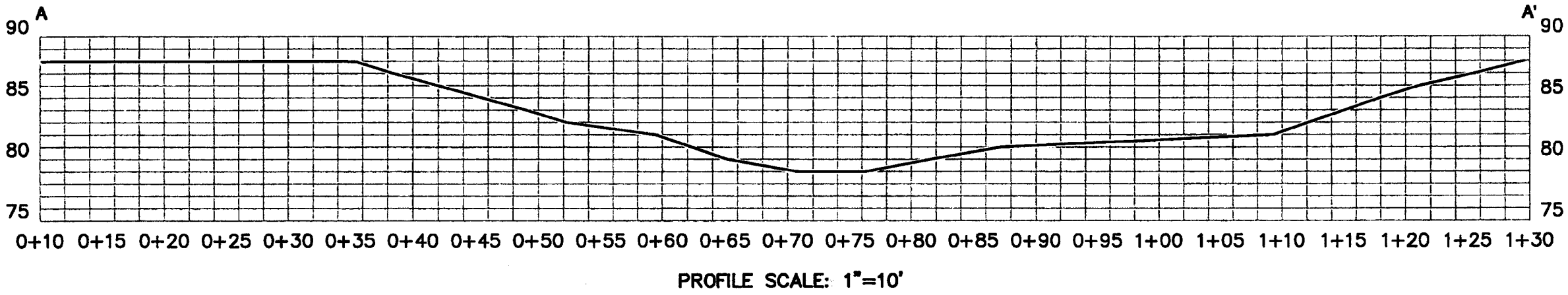
XX B4. Wetland type landscaping provided in accordance with approved plan. Includes correct pondscaping zones, plant species, planting arrangements, wetland beds, etc. Wetland plants include 5 to 7 emergent wetland species. Individual plants at 18 inches on center in clumps.

NA B5. Adequate wetland buffer provided (Typically 25 ft. outward from maximum design water surface elevation and 15 ft. setback to structures).

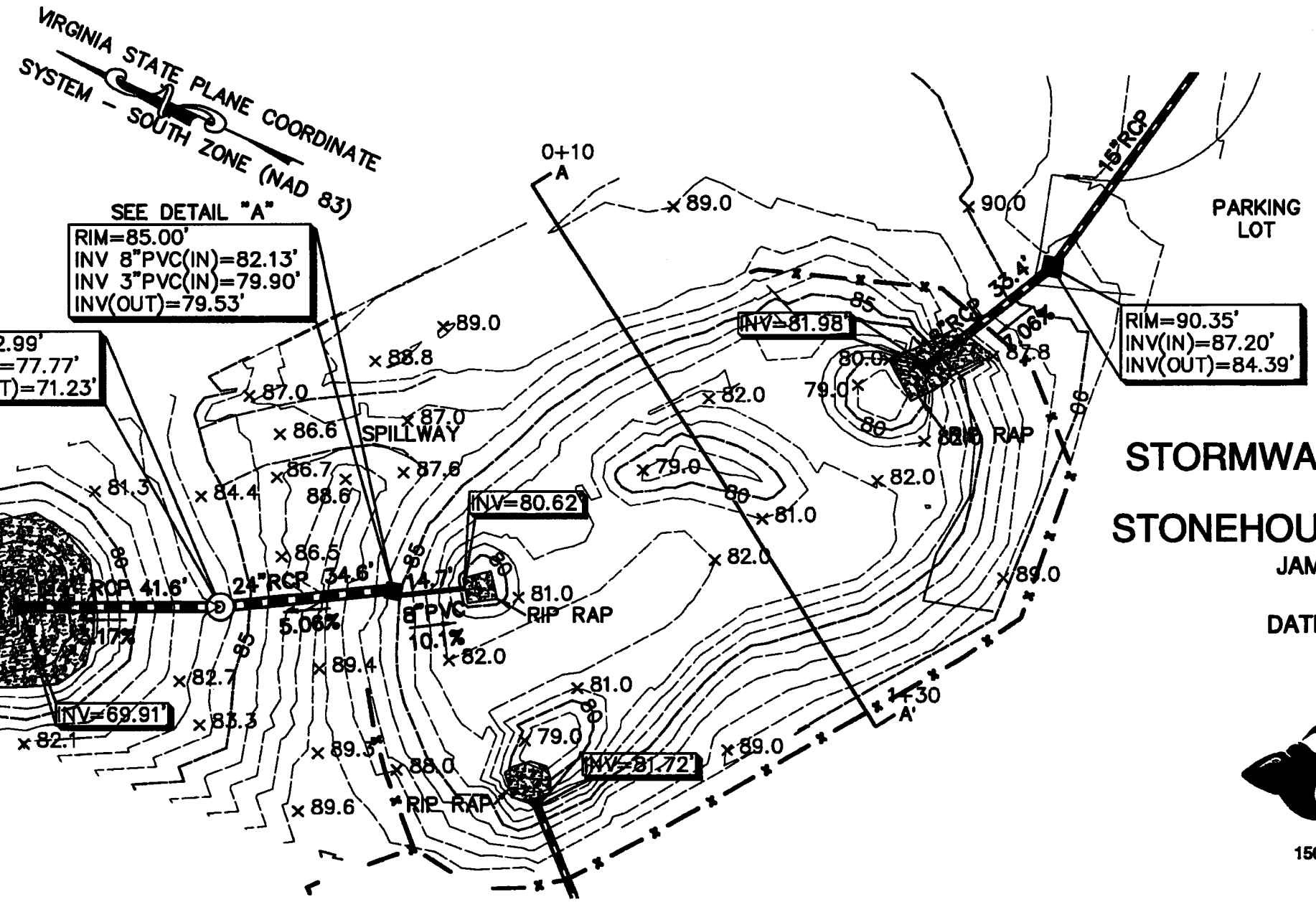
XX B6. No more than one-half (½) of the wetland surface area is planted.

XX B7. Topsoil or wetland mulch provided to support vigorous growth of wetland plants.

XX B8. Planting zones staked or flagged in field and locations subsequently established by appropriate field surveying methods for record drawing presentation.



PROFILE SCALE: 1"=10'



COMMONWEALTH OF VIRGINIA
GEORGE M. CUNHA
LIC. NO. 002659
12/27/13
LAND SURVEYOR

REV: 12-24-13 - REVISE STORM
REV: 2-27-14 - REVISE TOPO

RECORD DRAWING OF

STORMWATER MANAGEMENT POND

AT

STONEHOUSE ELEMENTARY SCHOOL

JAMES CITY COUNTY, VIRGINIA

PROJ. 13-061

DATE: 11/12/2013 SCALE: 1"=30'

CARDINAL SURVEY & DESIGN PLC
Land Surveying • Planning • 3D Imaging

150 STRAWBERRY PLAINS ROAD, SUITE D
WILLIAMSBURG, VIRGINIA 23188
(757) 345-2866 - (757) 345-2877 (FAX)

NOTES:

1. EXISTING CONDITIONS SHOWN ON THIS PLAT ARE THE RESULT OF AN ON-THE-GROUND SURVEY PERFORMED BY THIS FIRM ON NOVEMBER 12, 2013. 1' CONTOUR INTERVAL.

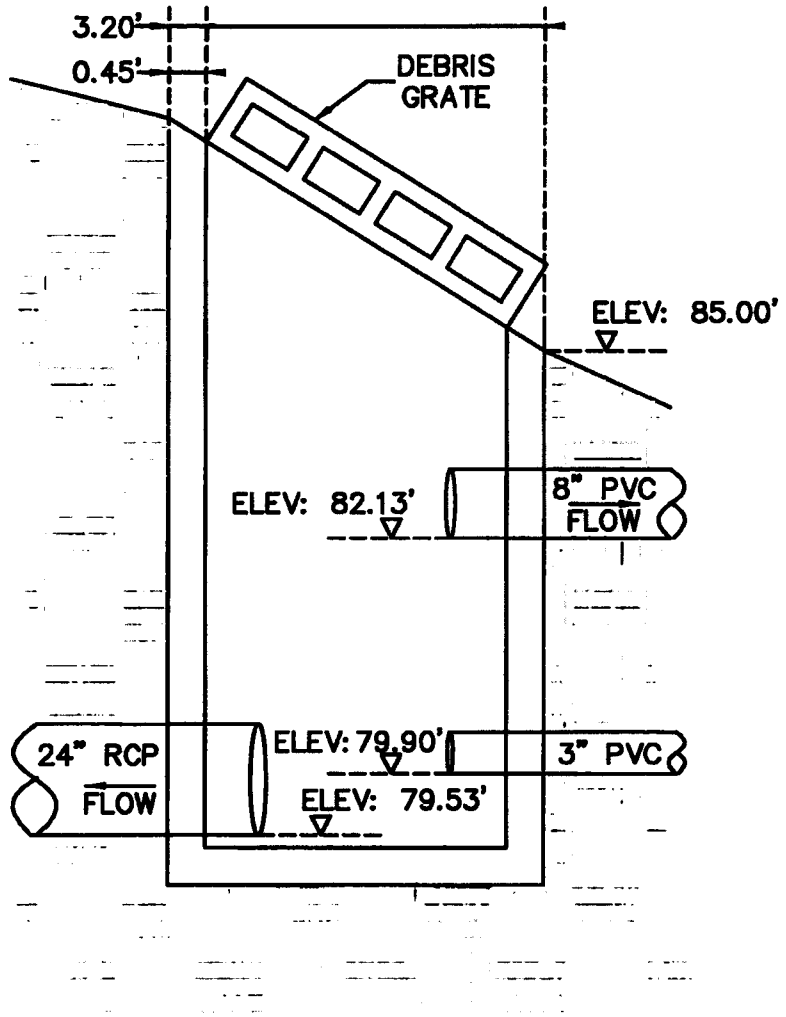
2. THE LOCATIONS OF UNDERGROUND UTILITIES SHOWN ON THIS PLAT ARE BASED UPON FIELD OBSERVATIONS. THEY ARE NOT WARRANTED TO BE EXACTLY LOCATED, NOR IS IT WARRANTED THAT ALL UNDERGROUND UTILITIES OR OTHER STRUCTURES ARE SHOWN ON THIS PLAT.

3. HORIZONTAL DATUM: VIRGINIA STATE PLANE COORDINATE SYSTEM SOUTH ZONE – NAD (83)

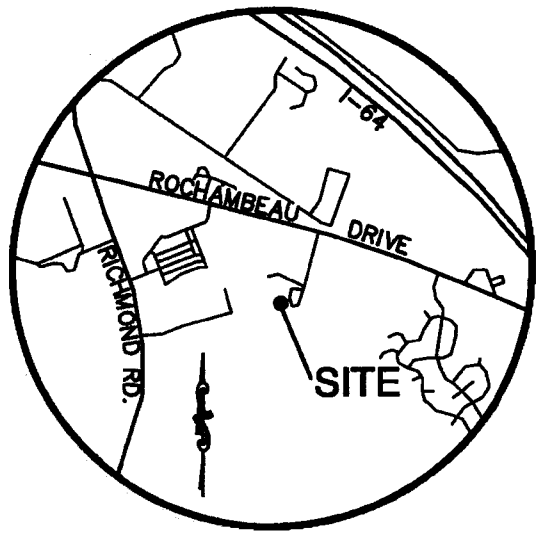
VERTICAL DATUM: NGVD-29

LEGEND

- STORM SYSTEM PIPE
- Ⓓ STORM MANHOLE
- YARD DRAIN INLET
- x 12.3 EXISTING ELEVATION
- ---1' INTERVAL CONTOUR
- —80— 5' INTERVAL CONTOUR



DETAIL "A"
NOT TO SCALE



VICINITY MAP
SCALE: 1"=4000'

RECORD DRAWING OF

STORMWATER MANAGEMENT POND

AT

STONEHOUSE ELEMENTARY SCHOOL

JAMES CITY COUNTY, VIRGINIA
PROJ. 13-061
DATE: 11/12/2013 SCALE: 1"=30'

COMMONWEALTH OF VIRGINIA
GEORGE M. CUNHA
LIC. NO. 002659
02/27/2014
LAND SURVEYOR

THIS PHYSICAL SURVEY HAS BEEN REVIEWED, AND IN MY PROFESSIONAL OPINION, BASED UPON MY KNOWLEDGE, INFORMATION, AND BELIEF, THE DESIGN ELEMENTS MEASURED BY THE PHYSICAL SURVEY COMPLY WITH THE APPROVED PLANS (EXCEPT AS SHOWN). THIS REVIEW DOES NOT IMPLY IN ANY WAY THAT;

(i) INSPECTIONS WERE MADE DURING THE CONSTRUCTION,
(ii) TO THE QUALITY OF THE WORK, OR
(iii) TO ANY ELEMENT OR STRUCTURE NOT VISIBLE OR DEPICTED ON THE PHYSICAL SURVEY.

REV: 12-24-13 – REVISE STORM
REV: 2-27-14 – REVISE TOPO

CARDINAL SURVEY & DESIGN PLC
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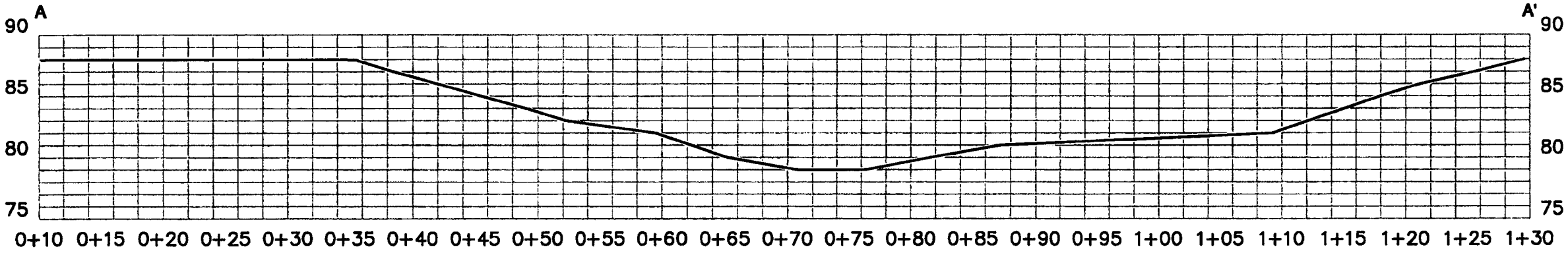

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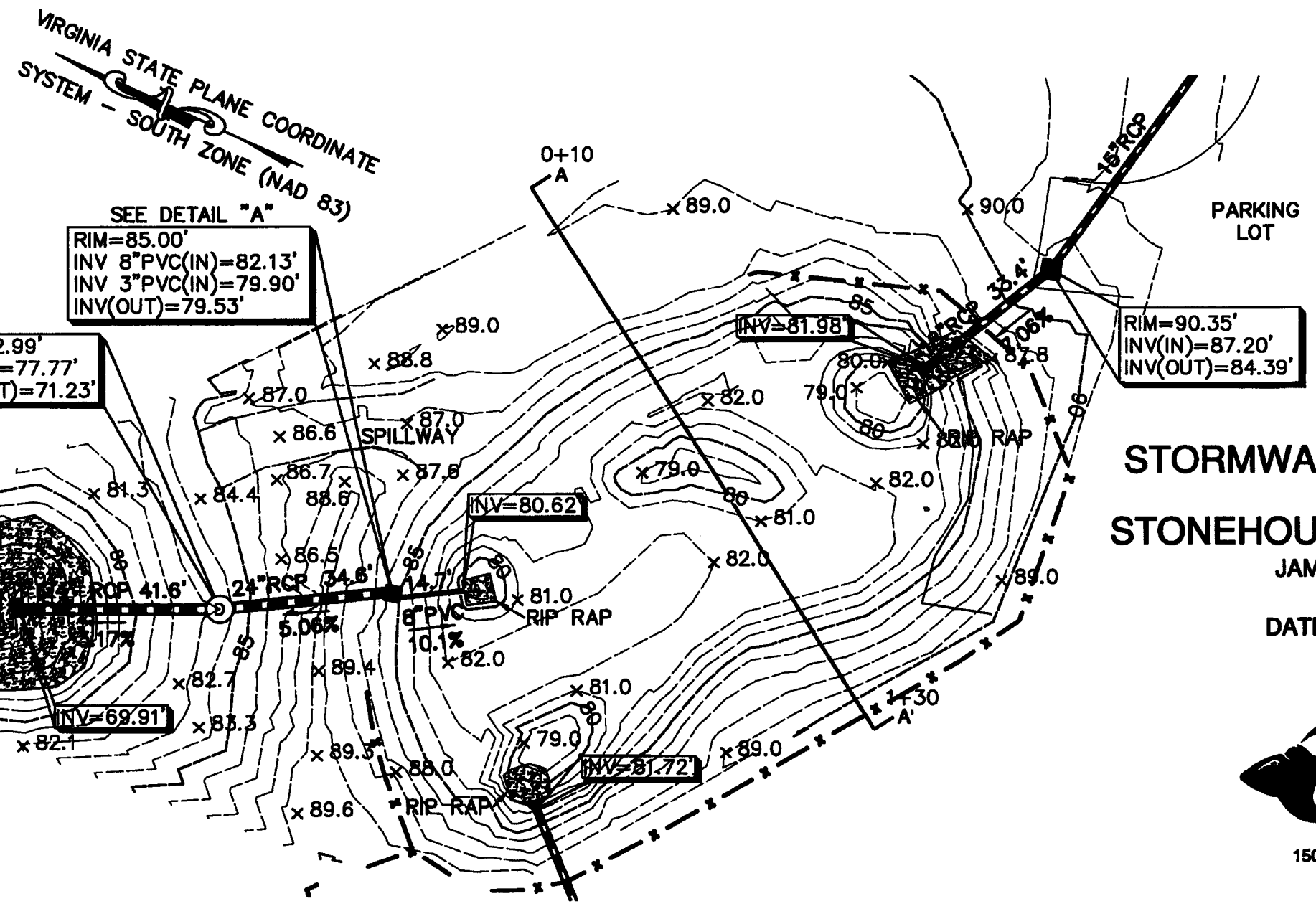

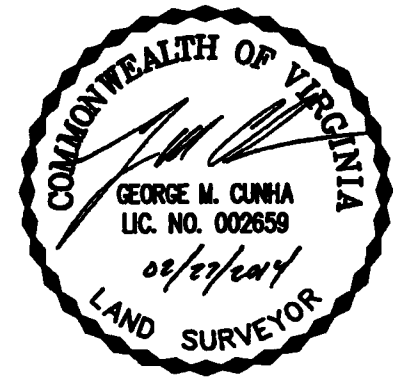

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RECORD DRAWING OF

STORMWATER MANAGEMENT POND

AT

STONEHOUSE ELEMENTARY SCHOOL

JAMES CITY COUNTY, VIRGINIA

PROJ. 13-061

DATE: 11/12/2013 SCALE: 1"=30'

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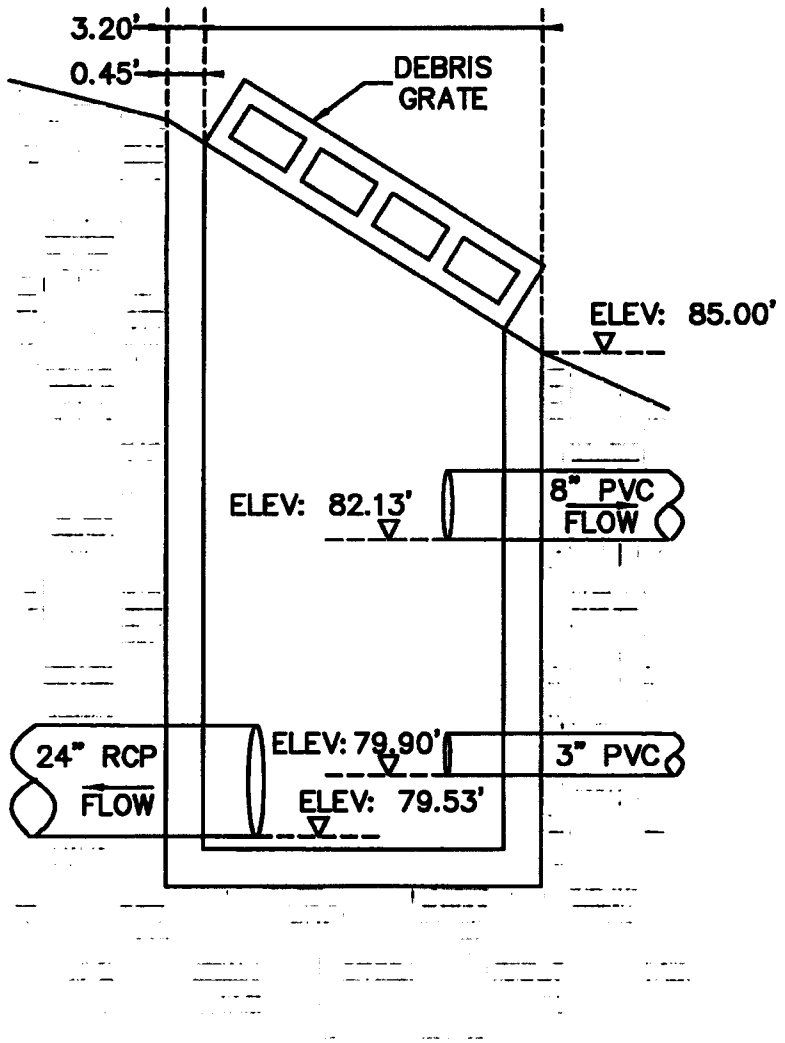
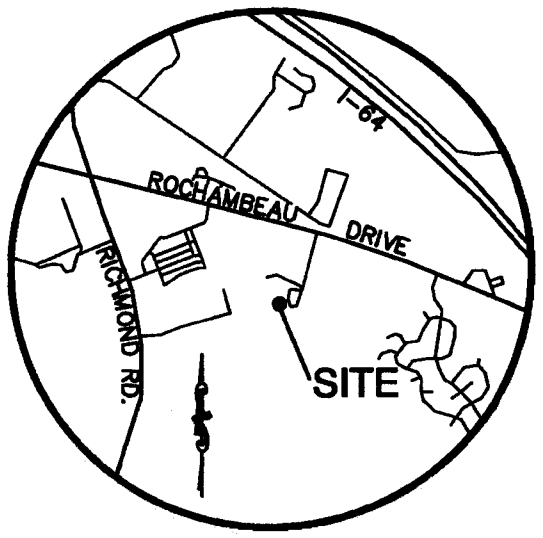


DETAIL "A"
NOT TO SCALE



VICINITY MAP
SCALE: 1"=4000'

RECORD DRAWING OF

STORMWATER MANAGEMENT POND

AT

STONEHOUSE ELEMENTARY SCHOOL

JAMES CITY COUNTY, VIRGINIA
PROJ. 13-061
DATE: 11/12/2013 SCALE: 1"=30'

COMMONWEALTH OF VIRGINIA
GEORGE M. CUNHA
LIC. NO. 002659
02/27/2014
LAND SURVEYOR

THIS PHYSICAL SURVEY HAS BEEN REVIEWED, AND IN MY PROFESSIONAL OPINION, BASED UPON MY KNOWLEDGE, INFORMATION, AND BELIEF, THE DESIGN ELEMENTS MEASURED BY THE PHYSICAL SURVEY COMPLY WITH THE APPROVED PLANS (EXCEPT AS SHOWN). THIS REVIEW DOES NOT IMPLY IN ANY WAY THAT;

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(ii) TO THE QUALITY OF THE WORK, OR
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REV: 12-24-13 – REVISE STORM
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CARDINAL SURVEY & DESIGN PLC
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150 STRAWBERRY PLAINS ROAD, SUITE D
WILLIAMSBURG, VIRGINIA 23188
(757) 345-2866 - (757) 345-2877 (FAX)

James City County Environmental Division
Stormwater Management / BMP Inspection Report
Detention and Retention Pond Facilities

County BMP ID Code (if known): WC046 for SP036-12

Name of Facility: Stonehouse Elem SW Repairs Retrofit BMP No.: 1 of 1 Date: 4/27/14

Location: 3651 Rochambeau Dr.

Name of Owner: WJCC

Name of Inspector: TCreech - M. Lewis

Type of Facility: Dry Pond

Weather Conditions: Sunny Type: ☑ Final Inspection ☐ County BMP Inspection Program ☐ Owner Inspection

If an inspection item is not applicable, mark NA, otherwise mark the appropriate column.

O.K. - The item checked is in adequate condition and the maintenance program is currently satisfactory. No action required.
Routine - The item checked requires attention, but does not present an immediate threat to the function/integrity of the BMP.
Urgent - The item checked requires immediate attention to keep the BMP operational and to prevent damage to the facility.

Provide an explanation and details in the comment column, if routine or urgent are marked.

Facility Item	O.K.	Routine	Urgent	Comments
Embankments and Side Slopes:				
Grass Height	✓			
Vegetation Condition	✓			
Tree Growth	✓			
Erosion	✓			
Trash & Debris	✓			
Seepage	✓			
Fencing or Benches	✓			
Interior Landscaping/Planted Areas: ☐ None ☑ Constructed Wetland/Shallow Marsh ☐ Naturally Established Vegetation				
Vegetated Conditions	✓			
Trash & Debris	✓			
Floating Material	✓			
Erosion	✓			
Sediment	✓			
Dead Plant	✓			
Aesthetics	✓			
Other				
Notes:				

Facility Item	O.K.	Routine	Urgent	Comments
Water Pools: ☐ Permanent Pool (Retention Basin) ☐ Shallow Marsh (Detention Basin) ☑ None, Dry (Detention Basin)				
Shoreline Erosion				
Algae				
Trash & Debris				
Sediment				
Aesthetics				
Other				
Inflows (Describe Types/Locations): 18" RCP				
Condition of Structure	✓			
Erosion	✓			
Trash and Debris	✓			
Sediment	✓			
Outlet Protection	✓			
Other				
Principal Flow Control Structure - Riser, Intake, etc. (Describe Type): 24" RCP / 48" Riser				
Condition of Structure	✓			
Corrosion	✓			
Trash and Debris	✓			
Sediment	✓			
Vegetation	✓			
Other				
Principal Outlet Structure - Barrel, Conduit, etc. : 24" RCP – 8" PVC				
Condition of Structure	✓			
Settlement	✓			
Trash & Debris				
Erosion/Sediment	✓			
Outlet Protection	✓			
Other				
Emergency Spillway (Overflow):				
Vegetation	✓			
Lining	✓			
Erosion	✓			
Trash & Debris	✓			
Other				
Notes:				

Facility Item	O.K.	Routine	Urgent	Comments
Nuisance Type Conditions:				
Mosquito Breeding	✓			
Animal Burrows	✓			
Graffiti	✓			
Other				
Surrounding Perimeter Conditions:				
Land Uses	✓			JCC School
Vegetation	✓			
Trash & Debris	✓			
Aesthetics	✓			
Access /Maintenance Roads or Paths	✓			
Other Fence	✓			locked

Remarks:

Overall Environmental Division Internal Rating: 4

Signature: Tina Reed **Date:** 4/27/14

Title: Env. Insp

SWMProg\BMP\CoInspProg\InspForms\DetRet.wpd

Tina Creech

From: Darryl Cook
Sent: Monday, October 07, 2013 4:34 PM
To: Mike Mullins (michael.mullins@jsgcorp.com); mike.hubbard@jsgcorp.com
Cc: David Greshamer; Tina Creech
Subject: Stonehouse Elementary School BMP Repair

Regarding two of the items discussed this morning, I wanted to document the decisions. Concerning the stilling basin location, I agreed to a relocation of it 15 feet upstream (closer to the embankment). All the dimensions of the stilling basin will remain the same. At the end of the project, the existing riprap check dam will be flattened out and used to protect the channel below the stilling basin to as close to the property line as the amount of stone will allow. The reason for the change is to reduce land disturbance as the further down the ravine, the steeper and narrower it becomes.

Concerning increasing the drop in the new manhole structure (SS#1-2) to reduce the slope of the outlet pipe, that is also acceptable as long as a minimum pipe slope of 4% is maintained on the outlet pipe. The slope of the existing barrel pipe, which was 3.6%, was used in the design of the pond. So as long as the slope is greater than 3.6% (I suggested 4% to make it a simpler calculation but it probably doesn't matter these days), then the change in slope and the drop in the structure is acceptable. One additional consideration is that the new barrel pipe needs to be laid at a slope of at least 3.6% to meet the original design calculations.

I still need to look into the trash rack issue. Let me know if you need anything else.

Darryl E. Cook
Capital Projects Coordinator

James City County VIRGINIA Jamestown 1607

General Services Department
5320 Palmer Lane, Suite 2A
Williamsburg, VA 23188
P: 757-259-1442
F: 757-259-5833
jamescitycountyva.gov

Tina Creech

From: Darryl Cook
Sent: Wednesday, September 25, 2013 1:07 PM
To: 'mike.hubbard@jsgcorp.com'; Mike Mullins (michael.mullins@jsgcorp.com); 'SGresham' (SGresham@ecslimited.com); Tina Creech; David Greshamer
Cc: Bob Cosby
Subject: Stonehouse ES BMP - Pipe Bedding

I spoke to Bob Cosby with AES and it was their intention that bedding not be provided below the concrete pipe. If there are problems with the soil for the pipe to be installed in the area below the dam, then up to 4 inches of #57 stone can be provided but no stone should be placed under the pipe within the dam section.

Darryl E. Cook
Capital Projects Coordinator

James City County VIRGINIA Jamestown 1607

General Services Department
5320 Palmer Lane, Suite 2A
Williamsburg, VA 23188
P: 757-259-1442
F: 757-259-5833
jamescitycountyva.gov

REPORT OF

SUBSURFACE EXPLORATION AND GEOTECHNICAL ENGINEERING ANALYSIS

STONEHOUSE ELEMENTARY SCHOOL
BMP SPILLWAY REPAIR
JAMES CITY COUNTY, VIRGINIA

ECS MID-ATLANTIC, LLC PROJECT NO. 07:10665

For

Mr. Barry Moses, P.E.
James City County Stormwater Division
287 McLaws Circle Suite 1
Williamsburg, VA 23185-5649

June 29, 2010

SP-39-12

- ADDRESSES CONDITION OF EMBANKMENT & SPILLWAY + PROP. REPAIR WORK
- Does not address pond storage area ability to hold water in wetlands.

ECS MID-ATLANTIC, LLC
Geotechnical • Construction Materials • Environmental • Facilities

June 29, 2010

Mr. Barry Moses, P.E.
James City County Stormwater Division
287 McLaws Circle Suite 1
Williamsburg, VA 23185-5649

ECS Project No. 07:10665

Reference: Report of Subsurface Exploration and Geotechnical Engineering Analysis
Stonehouse Elementary School BMP Spillway Repair
James City County, Virginia

Dear Mr. Moses:

ECS Mid-Atlantic, LLC (ECS) is pleased to submit this report of our subsurface exploration and geotechnical engineering analysis for the above referenced project. The purpose of this investigation was to ascertain the nature of the erosion affecting the spillway pipe and embankment, develop recommendations for repairs, and provide earthwork specifications for the project.

ECS accomplished these purposes by drilling soil test borings and analyzing the soil samples from the borings to evaluate pertinent engineering properties. On this basis we developed our geotechnical engineering recommendations. No other warranties are expressed or implied.

The conclusions and recommendations contained in this report are based upon a total of two (2) soil test borings drilled to depths of 20 feet below the existing grades, a site reconnaissance performed by an ECS engineer, and laboratory test results of boring samples. The borings were located in the field by ECS personnel in the immediate vicinity of the spillway pipe. The recommendations contained herein were developed from the data obtained in the soil borings which indicate subsurface conditions at these specific locations at the time of the exploration. Subsurface conditions may vary between the borings. If during the course of construction variations appear evident, the Geotechnical Engineer should be informed so that the conditions can be addressed. Geotechnical design recommendations were developed based on the project characteristics described herein. Should actual project characteristics differ from those discussed herein, this company should be informed such that a review of these characteristics can be performed.

Project Characteristics

The project site consists of a wet detention pond comprising part of the stormwater management system for Stonehouse Elementary School. The pond was created by excavation of the impoundment and construction of an approximately 10 to 15-foot high dam embankment. The principal spillway consists of a pre-cast, grated inlet with a concrete pipe extending to a flared outlet. There has been considerable ground subsidence on the upstream face of the embankment just above the inlet and erosion of the downstream face of the dam embankment around the outlet pipe. A sink hole has developed above the pipe on the crest of the dam. It is not known if the pipe is leaking, allowing embankment soils to erode into the pipe, or if piping is causing erosion around the pipe. However, the erosion appears progressive.

Investigative Procedures

An ECS engineer performed a reconnaissance of the site prior to mobilization of the drill crew. Two (2) soil test borings were performed on this site on June 1, 2010. The borings were performed from the dam crest on either side of the spillway pipe. The borings were extended to a depth of 20 feet. The borings were performed with an ATV drill rig which utilized continuous-flight, solid-stem augers to advance the boreholes. Drilling services were provided by SDS, LLC of Toano, Virginia. Boring locations are indicated on the Boring Location Diagram included as Enclosure I of this report.

Representative samples were obtained by means of the split-barrel sampling procedure in accordance with ASTM Specification D-1586. In this procedure, a 2 inch O.D., split barrel sampler is driven into the soil a distance of 24 inches by a 140-pound hammer falling 30 inches. The number of blows required to drive the sampler through a 12-inch interval is termed the Standard Penetration Test (SPT) value and is indicated for each sample on the boring logs. This value can be used as a qualitative indication of the in-place relative density of cohesionless soils. In a less reliable way, it also indicates the consistency of cohesive soils. This indication is qualitative, since many factors can significantly affect the Standard Penetration resistance value and thus prevent a direct correlation between drill crews, drill rigs, drilling procedures, and hammer-rod-sampler assemblies. Samples were taken continuously to a depth of 10 feet and at 5-foot intervals thereafter. After recovery, representative portions of each sample were removed from the sampler and sealed in glass jars.

An experienced Geotechnical Engineer visually classified each soil sample from the borings on the basis of texture and plasticity in accordance with the Unified Soil Classification System (USCS) and ASTM D2488 (Description and Identification of Soils-Visual/Manual Procedures). The group symbols for each soil type are indicated in parentheses following the soil descriptions on the boring logs. The Geotechnical Engineer grouped the various soil types into the major zones noted on the boring logs of Enclosure II of this report. The stratification lines designating the interfaces between earth materials on the boring logs are approximate; in-situ, the transitions may be gradual.

A description of the Unified Classification System and Reference Notes for the boring logs are included in Enclosure III of this report.

Subsurface Conditions

The two soil borings were performed from the top of the dam embankment either side of the spillway pipe to ascertain the content and condition of the embankment fill in the vicinity of the spillway pipe and erosion features. Topsoil on the dam embankment was observed to be about 4 inches. In general, the dam

embankment fill was observed to be about 8 feet deep and consisted primarily of Silty, fine SANDS (SM) of loose to medium dense relative density. Between 4 and 6 feet in B-1 and 2 and 4 feet in B-2, the Sands contained appreciable amounts of Clay. However, a Clay core was not encountered. Natural materials underlying the dam embankment consisted of deposits of Silty to Clayey to relatively clean, fine and fine to medium SANDS (SM, SM-SC, and SP) of medium dense relative density.

Observations for groundwater were made during sampling and upon completion of the drilling operations at each boring location. In auger drilling operations, water is not introduced into the boreholes, and the groundwater position can often be determined by observing water flowing into or out of the boreholes. Furthermore, visual observation of the soil samples recovered during the auger drilling exploration can often be used in evaluating the groundwater conditions. A groundwater table was not encountered by the 20-foot deep borings. Soils between 8 feet and 12 to 17 feet were very moist, while the soils below 12 to 17 feet were only moist, suggesting the spillway pipe is not submerged in a general seepage path through the embankment.

Conclusions

1. It does not appear that the spillway pipe is submerged below the level of the general seepage plane through the embankment. Given the granular nature of the foundation soils, seepage paths from the impoundment may actually be oriented more vertically downward from the pond bottom than horizontally through the embankment. In this regard, there would not be a strong tendency for piping along the sides of the spillway pipe, assuming well compacted soils were present around the pipe. Considering this, we expect it is most likely that water is moving from the impoundment to the outlet through relatively loose soils around the pipe, resulting in erosion around the pipe and collapse of overlying embankment fill materials.

2. It was not within the scope of this investigation to determine whether anti-seep devises, such as anti-seep collars, are present. If present, they do not appear to be effective given the soil types which comprise the embankment.

3. It is possible that erosion around the pipe or consolidation of loose foundation soils below the pipe may have resulted in pipe deflection and loss of joint integrity. However, this was not explored within the scope of this investigation.

4. The borings do not indicate the presence of a Clay core, which would be employed in a zoned earth embankment. Nor do the embankment soils (Sands) appear to possess a sufficiently low permeability to be considered suitable for a homogeneous earth embankment. However, given the relatively small elevation difference between the impoundment's normal pool and the dam toe, this does not appear to be compromising the embankment's stability. The presence of relatively porous soils would make the spillway pipe subject to development of piping, particularly if soils around the pipe were not well compacted. Therefore, the repair plan should include replacement of soils around the pipe with Clayey soil material.

Embankment Repair Recommendations

1. To facilitate repair to the spillway, we recommend the pond be drained and the spillway pipe exposed in an excavation at least 3 feet wider than the pipe either side of the pipe at its invert elevation and with side slopes of 2H:1V or flatter.

2. Once exposed, the pipe should be inspected for settlement and loss of joint integrity. If excessive settlement has occurred, as defined by the County's Civil Engineering consultant, the affected pipe segments should be reset and joint seals repaired, as necessary.

3. In order to provide a competent base for the pipe and to help minimize piping along the pipe, we recommend that the pipe be supported by a Flowable Fill cradle extending from the upstream face of the dam embankment to the downstream outlet. The cradle should be at least 12 inches wider than the pipe either side of the pipe and 12 inches thick below the pipe. It should extend up to at least the pipe spring line or haunches (mid-point). The cradle should be cast in place against the pipe bottom surface, and the sides of the cradle should be cast against the sides of a trench excavated to facilitate its placement. The cradle need not be poured continuously. The pipe sections should be anchored as necessary to prevent floating.

4. In order to help protect against piping along the horizontal spillway pipe, we recommend that the horizontal spillway pipe be provided with one, cast-in-place concrete anti-seepage collar, as indicated in Figure 1 below. The collar should be at least 12 inches thick and extend beyond the top and side surfaces of the culvert at least 2 feet. The collar need not extend below the pipe cradle. The collar should be positioned below the downstream edge of the crest.

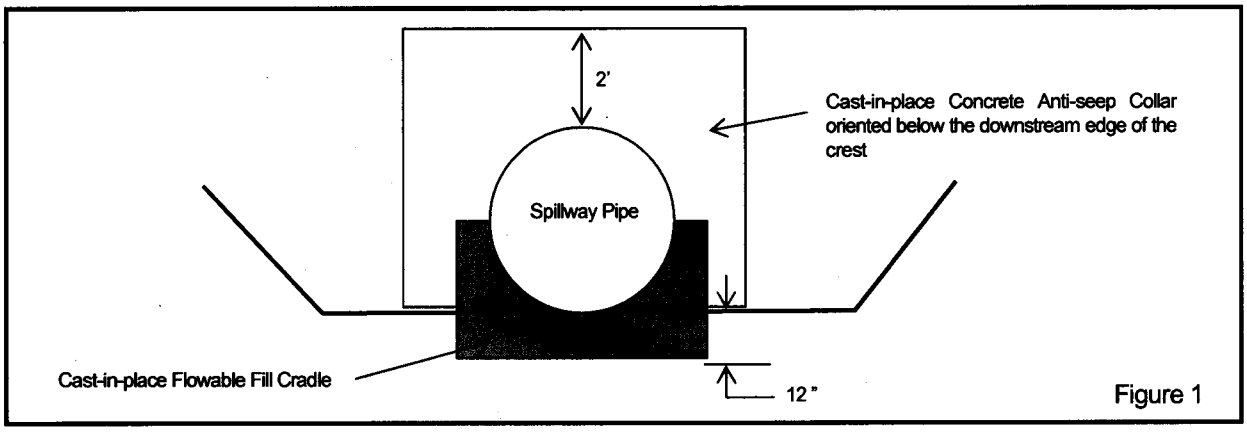


Figure 1

5. It is recommended that the dam repair section be constructed as a homogeneous earth embankment; that is, the repair cross section will not contain a distinct core and cover. Soil fill used in the repair section should satisfy the criteria for Embankment Fill discussed in the next section. We recommend the new embankment have side slopes no steeper than the existing embankment and a crest width of no less than the existing embankment.

6. In order to allow for seepage around the outlet, we recommend that the embankment surface within 3 feet beside and 1 foot above the outlet structure be covered with a non-woven filter fabric, a 6-inch layer of No. 3 Stone, and a 12-inch layer of Class II rip rap.

Construction Recommendations

1. Prior to initiation of earthwork operations, the pond should be drained so that water does not flow into the excavation.

2. Subgrade preparation should include removal of any unsuitable material or excessively loose or porous soils from below the pipe cradle excavation bottom. The Geotechnical Engineer should be called on to observe all pipe support subgrades prior to backfilling to assure that competent foundation materials have been exposed.

3. It is essential that the side slopes of the repair section be laid back for safety as well as to allow compaction equipment to thoroughly compact Embankment Fill at the new fill-existing embankment interface. In this regard, the work area should be benched level and the side slopes graded to a maximum slope of 2H:1V, or flatter if necessary for safety.

4. Fill used to reconstruct the dam embankment around the spillway pipe (Embankment Fill) should consist of an inorganic soil material classified as SC, CL, or CH containing at least 40% fines (Silt and Clay). Maximum rock size should be limited to 6 inches. Any concentrations of rock material which impede compaction of the fill or which create void space in the fill should be removed. Silty Sands (SM and SP-SM) as well as clean Sands (SP) are not suitable for use in the dam embankment. In this regard, we recommend that material excavated from the existing dam not be reused in the repair section. Materials which are suitable as Embankment Fill will require importation from off-site sources or borrowing from suitable on-site sources, if available. No investigation of the suitability or location of potential on-site borrow materials has been performed as part of this study. The Geotechnical Engineer should be called on to evaluate materials proposed for use as Embankment Fill to assure they are suitable.

5. All Embankment Fill should be placed in maximum 8-inch loose lifts (4 inches for light compaction equipment) and moisture conditioned to within +/- 3% of the soil's optimum moisture content prior to compaction. Compaction should be accomplished using sheepsfoot and, if necessary, smooth drum rollers until a minimum density of 95% of the soil's Standard Proctor maximum dry density (ASTM D698) is achieved. Care should be exercised to achieve thorough compaction around structures using hand tampers. Thin fill lifts and hand tampers should be used against the sides of the pipe and around the anti-seep collar to assure that the

   fill is adequately compacted. The side slopes of the repair section are to be sloped at 2H:1V or flatter. The purpose of this is to allow compaction equipment to roll from fill area to slope and compact within the transition zone between the two. A qualified Soils Technician under the direction of a Geotechnical Engineer should be called on to provide compaction testing during the fill placement to assure that the minimum compaction requirements are being met. At least 1 test per per lift should be performed.

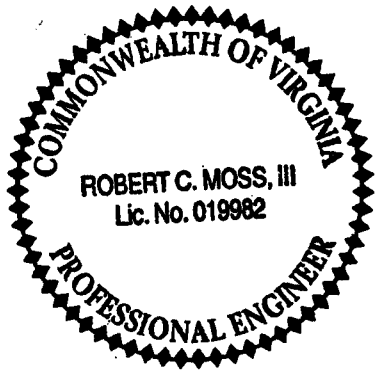
6. Dam maintenance is an essential requirement for assuring that dams perform as intended over time. The embankment should be periodically inspected for indications of seepage and erosion. Trees and brush should be removed from the embankment and should be kept from growing on the embankment, heavy grass growth should be maintained, and animal burrows should be filled. Pipes should be inspected for indications of leakage or for the presence of sediment, which might indicate leakage. If deterioration which might compromise the performance or safety of the dam is observed, a qualified Geotechnical Engineer should be called on to assist in the repair.

Closing

We appreciate the opportunity to be of service to you on this project. Should you have questions concerning this investigation, or if we can provide construction testing and inspection services, please contact our office.

Respectfully,

ECS Mid-Atlantic, LLC



Robert C. Moss, III, P.E.
Principal Engineer

Michael J. Galli, P. E.
VP, Branch Manager

Enclosures:
I. Boring Location Diagram
II. Soil Boring Logs
III. Unified Soil Classification System and Reference Notes for Boring Logs
IV. Summary of Laboratory Test Data

Copies: (1) Client via email [BMoses@james-city.va.us]

Projects/2010/geotech/10665.doc

ENCLOSURES

I. Boring Location Diagram

II. Soil Boring Logs

III. Unified Soil Classification System and Reference Notes for Boring Logs

IV. Summary of Laboratory Test Data

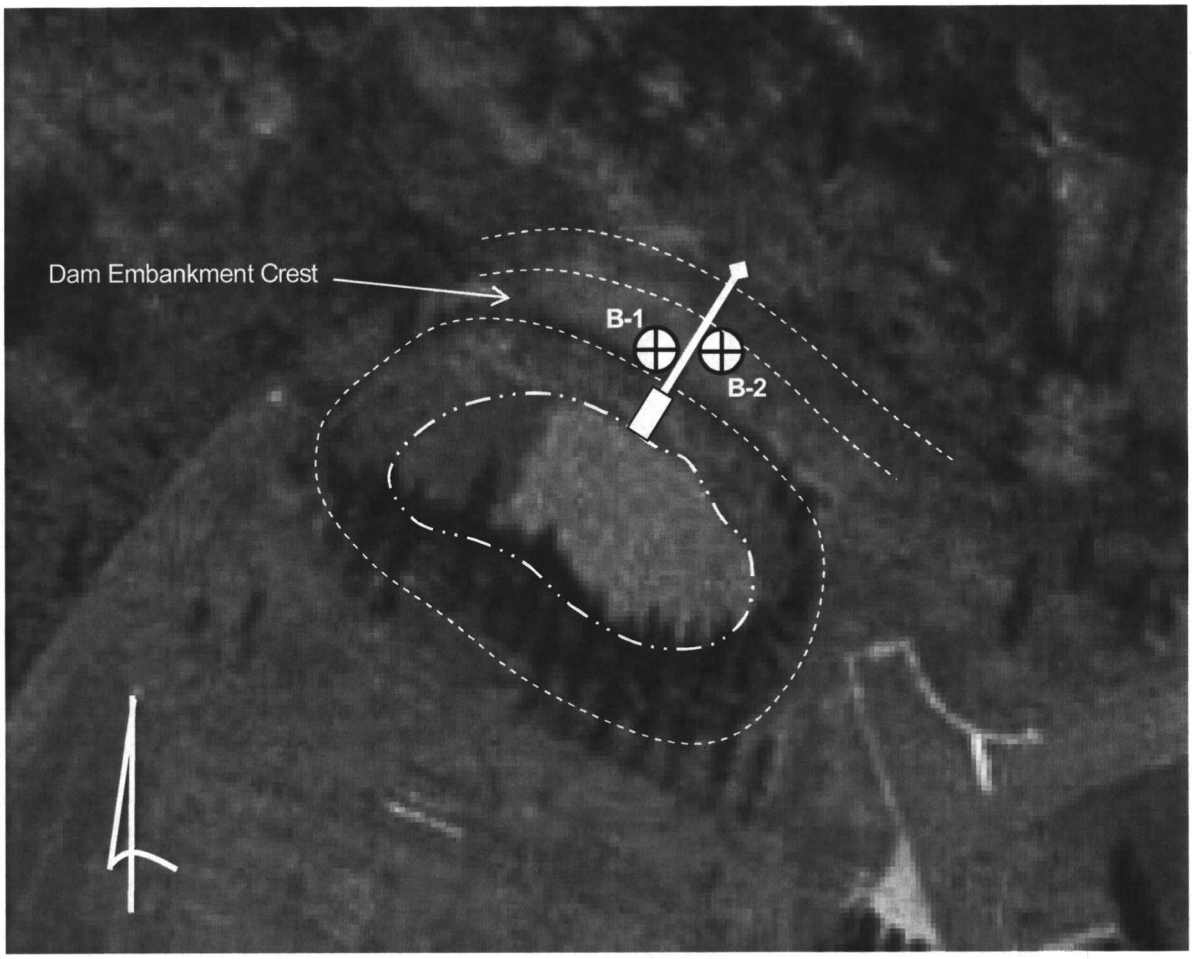
Enclosure I

Boring Location Diagram

Enclosure I

Boring Location Diagram

Stonehouse Elementary School BMP Spillway Repair
James City County, Virginia
ECS Mid-Atlantic, LLC Project No. 07:10665



Enclosure II

Soil Boring Logs

CLIENT	JOB #	BORING #	SHEET
James City County Stormwater Division	10665	B-1	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
Stonehouse ES BMP Dam Investigation	

ECS LLC MID-ATLANTIC

SITE LOCATION
James City County, Virginia

Dam Embankment

CALIBRATED PENETROMETER TONS/FT.^{2} 1 2 3 4 5+

PLASTIC LIMIT % X — WATER CONTENT % — LIQUID LIMIT % Δ

ROCK QUALITY DESIGNATION & RECOVERY
RQD% — — — REC.%
20% 40% 60% 80% 100%

⊗ STANDARD PENETRATION BLOWS/FT.
10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS
BOTTOM OF CASING ▶ — LOSS OF CIRCULATION 100%
SURFACE ELEVATION

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS ELEVATION (FT)	STANDARD PENETRATION BLOWS/FT.
0	1	SS	24	12	Topsoil Depth 4"		16 (2-8-8-12)
	2	SS	24	21	FILL – Silty Fine SAND, Trace Organics And Roots, Dark Gray, Moist, Loose to Medium Dense, (SM)		19 (5-9-10-13)
5	3	SS	24	14	FILL – Silty to Clayey Fine SAND, With Clay Seams, Gray and Brown, Moist, Loose, (SM-SC)		6 (3-3-3-6)
	4	SS	24	18			20 (6-10-10-13)
	5	SS	24	17	FILL – Silty Fine SAND, Trace Clay Pockets, Light and Dark Gray, Moist, Medium Dense, (SM)		21 (9-10-11-14)
10					Silty Fine SAND, Light Gray and Tan Mottled, Very Moist, Medium Dense, (SM)		
	6	SS	24	24	Silty to Clayey Fine SAND, With Clay Seams, Orange and Brown, Very Moist, Medium Dense, (SM-SC)		24 (10-11-13-15)
15							
	7	SS	24	23	Silty Fine to Medium SAND, Trace Clay, Orange Brown, Moist, Medium Dense, (SM)		20 (7-9-11-13)
20					END OF BORING @ 20.00'		
25							
30							

16.6
11.0
13.3

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN-SITU THE TRANSITION MAY BE GRADUAL

▽WL Dry WS OR WD	BORING STARTED 6/1/10	
▽WL(BCR) ▽WL(ACR)	BORING COMPLETED 6/1/10	CAVE IN DEPTH ● 17 FT
▽WL	RIG SDS FOREMAN Mike	DRILLING METHOD SSA

RMOSS (08-14-10) RMOSS (08-14-10) RMOSS (08-14-10) RMOSS (08-22-10)

CLIENT	JOB #	BORING #	SHEET
James City County Stormwater Division	10665	B-2	1 OF 1
PROJECT NAME	**ARCHITECT-ENGINEER**		
Stonehouse ES BMP Dam Investigation			

ECS LLC MID-ATLANTIC

SITE LOCATION
James City County, Virginia

Dam Embankment

CALIBRATED PENETROMETER TONS/FT.² (1 2 3 4 5+)
PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (X — ● — Δ)
ROCK QUALITY DESIGNATION & RECOVERY RQD% — — — REC.% (20% 40% 60% 80% 100%)
⊗ STANDARD PENETRATION BLOWS/FT. (10 20 30 40 50+)

DESCRIPTION OF MATERIAL — ENGLISH UNITS
BOTTOM OF CASING ▶ — LOSS OF CIRCULATION 100%
SURFACE ELEVATION

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS ELEVATION (FT)	STANDARD PENETRATION BLOWS/FT.
0	1	SS	24	16	Topsoil Depth 4"		21 (6-7-14-17)
	2	SS	24	19	FILL – Silty Fine SAND, Trace Organics, Light Gray and Dark Gray, Moist, Medium Dense, (SM)		20 (7-9-11-13)
5	3	SS	24	14	FILL – Silty CLAY, With Seams of Clayey Fine SAND, Light Brown and Light Gray, Moist, Very Stiff, (CL/SC)	10.1	13 (4-6-7-9)
	4	SS	24	21			12 (3-6-6-9)
	5	SS	24	20	FILL – Silty Fine SAND, Trace Clay Pockets, Light Gray, Moist, Medium Dense, (SM)	13.8	12 (4-5-7-7)
10					FILL – Silty Fine SAND, Gray and Light Gray, Moist, Medium Dense, (SM)		
	6	SS	24	24	Clayey to Silty Fine SAND, Brownish Gray, Very Moist, Medium Dense, (SC-SM)		15 (4-7-8-10)
15					Silty to Clayey Fine SAND, With Clay Seams, Orange and Brown, Moist, Medium Dense, (SM-SC)		
	7	SS	24	23	Fine SAND, Trace Silt, Yellowish Tan, Moist, Medium Dense, (SP)		17 (5-8-9-11)
20					Silty Fine to Medium SAND, Trace Clay, Orange and Brown, Moist, Medium Dense, (SM)		
25					END OF BORING @ 20.00'		
30							

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN-SITU THE TRANSITION MAY BE GRADUAL

▽WL Dry WS OR ▽D	BORING STARTED 6/1/10	
▽WL(BCR) ▽WL(ACR)	BORING COMPLETED 6/1/10	CAVE IN DEPTH ● 17.5 FT
▽WL	RIG SDS FOREMAN Mike	DRILLING METHOD SSA

RMOSS (06-14-10) RMOSS (06-14-10) RMOSS (06-14-10) RMOSS (06-22-10)

Rboss(06/10/2010 05:08:17 pm)

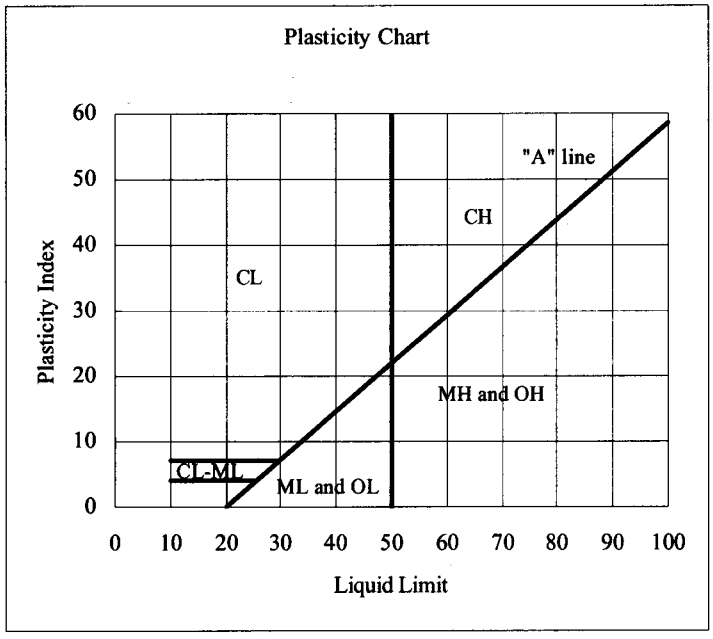
Enclosure III

Unified Soil Classification System and Reference Notes for Boring Logs

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D-2487)

Major Divisions			Group Symbols		Typical Names	Laboratory Classification Criteria	
Coarse-grained soils (More than half of material is larger than No. 200 Sieve size)	Gravels (More than half of coarse fraction is larger than No. 4 sieve size)	Clean gravels (Little or no fines)	GW		Well-graded gravels, gravel-sand mixtures, little or no fines	$C_u = D_{60}/D_{10}$ greater than 4 $C_c = (D_{30})^2/(D_{10}xD_{60})$ between 1 and 3	
			GP		Poorly graded gravels, gravel-sand mixtures, little or no fines	Not meeting all gradation requirements for GW	
		Gravels with fines (Appreciable amount of fines)	GM[a]	d	Silty gravels, gravel-sand mixtures	Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
				u			
			GC		Clayey gravels, gravel-sand-clay mixtures	Atterberg limits below "A" line or P.I. less than 7	
	Sands (More than half of coarse fraction is smaller than No. 4 sieve size)	Clean sands (Little or no fines)	SW		Well-graded sands, gravelly sands, little or no fines	$C_u = D_{60}/D_{10}$ greater than 6 $C_c = (D_{30})^2/(D_{10}xD_{60})$ between 1 and 3	
			SP		Poorly graded sands, gravelly sands, little or no fines	Not meeting all gradation requirements for SW	
		Sands with fines (Appreciable amount o fines)	SM[a]	d	Silty sands, sand-silt mixtures	Atterberg limits above "A" line or P.I. less than 4	Limits plotting in CL-ML zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
				u			
			SC		Clayey sands, sand-clay mixtures	Atterberg limits above "A" line with P.I. greater than 7	
Fine-grained soils (More than half material is smaller than No. 200 Sieve)	Silts and clays (Liquid limit less than 50)		ML		Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity		
			CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays		
			OL		Organic silts and organic silty clays of low plasticity		
	Silts and clays (Liquid limit greater than 50)		MH		Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts		
			CH		Inorganic clays of high plasticity, fat clays		
			OH		Organic clays of medium to high plasticity, organic silts		
	Highly Organic soils		Pt		Peat and other highly organic soils		

Determine percentage of sand and gravel from grain-size curve.
Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:
Less than 5 percent GW, GP, SW, SP
More than 12 percent GM, GC, SM, SC
5 to 12 percent Border 4 line cases requiring dual symbols[b]



[a] Division of GM and SM groups into subdivisions of d and u are for roads and airfields only. Subdivision is based on Atterberg limits; suffix d used when L.L. is 28 or less and the P.I. is 6 or less; the suffix u used when L.L. is greater than 28.

[b] Borderline classifications, used for soils possessing characteristics of two groups, are designated by combinations of group symbols. For example: GW-GC,well-graded gravel-sand mixture with clay binder. (From Winterkorn and Fang. 1975)

REFERENCE NOTES FOR BORING LOGS

I. Drilling Sampling Symbols:

SS	Split Spoon Sampler	ST	Shelby Tube Sampler
RC	Rock Core, NX, BX, AX	PM	Pressuremeter
DC	Dutch Cone Penetrometer	RD	Rock Bit Drilling
BS	Bulk Sample of Cuttings	PA	Power Auger (no sample)
HAS	Hollow Stem Auger	WS	Wash sample

II. Correlation of Penetration Resistances to Soil Properties:

Standard Penetration (blows/ft) refers to the blows per foot of a 140 lb. hammer falling 30 inches on a 2-inch OD split-spoon sampler, as specified in ASTM D-1586. The blow count is commonly referred to as the N value.

A. Non-Cohesive Soils (Silt, Sand Gravel and Combinations)

Density		*Relative Properties*	
Under 4 blows/ft	Very Loose	Adjective Form	12% to 49%
4 to 10 blows/ft	Loose	With	5% to 12%
11 to 30 blows/ft	Medium Dense		
31 to 50 blows/ft	Dense		
Over 51 blows/ft	Very Dense		

Particle Size Identification		
Boulders		8 inches or larger
Cobbles		3 to 8 inches
Gravel	Coarse	1 to 3 inches
	Medium	½ to 1 inch
	Fine	¼ to ½ inch
Sand	Coarse	2.00 mm to ¼ inch (dia. of lead pencil)
	Medium	0.42 to 2.00 mm (dia. of broom straw)
	Fine	0.074 to 0.42 mm (dia. of human hair)
Silt and Clay		0.0 to 0.074 mm (particles cannot be seen)

B. Cohesive Soils (Clay, Silt, and Combinations)

Blows/ft	*Consistency*	*Unconfined Comp. Strength Q_p (tsf)*	*Degree of Plasticity*	*Plasticity Index*
Under 2	Very Soft	Under 0.25	None to slight	0 – 4
2 to 4	Soft	0.25-0.49	Slight	5 – 7
5 to 8	Medium Stiff	0.50-0.99	Medium	8 – 22
9 to 15	Stiff	1.00-1.99	High to Very High	Over 22
16 to 30	Very Stiff	2.00-3.00		
Over 30	Hard	Over 4.00		

III. Water Level Measurement Symbols:

WL	Water Level	BCR	Before Casing Removal	DCI	Dry Cave-In
WS	While Sampling	ACR	After Casing Removal	WCI	Wet Cave-In
WD	While Drilling	▽	Existing Groundwater Level	▼	Est. Seasonal High GWT

The water levels are those levels actually measured in the borehole at the times indicated by the symbol. The measurements are relatively reliable when augering, without adding fluids, in a granular soil. In clay and plastic silts, the accurate determination of water levels may require several days for the water level to stabilize. In such cases, additional methods of measurement are generally applied.

Enclosure IV

Summary of Laboratory Test Data

Stonehouse Elementary School BMP Spillway Repair
James City County, Virginia

ECS Mid-Atlantic, LLC Project No. 07:10665

Boring No.	Sample No.	Sample Depth (ft)	Natural Moisture Content (%)	Silt or Clay Content (%)	Unified Soil Classification
B-1	S-3	4-6	16.6	47.6	SM-SC
B-1	S-4	6-8	11.0	23.1	SM
B-1	S-5	8-10	13.3	29.9	SM
B-2	S-3	4-6	10.1	21.1	SM
B-2	S-4	6-8	13.8	27.1	SM

PLANNING DIVISION

JUN 17 2013

RECEIVED

DRAINAGE CALCULATIONS

FOR

STONEHOUSE ELEMENTARY

SITE: WC 046 BMP CONVERSION

Environmental Division

JUN 20 2013

RECEIVED

James City County

SUBMITTED TO:

Environmental Division
James City County

COMMONWEALTH OF VIRGINIA
ROBERT E. CLOSEY, III
Lic. No. 035664
6/17/13
PROFESSIONAL ENGINEER

Prepared By:

AES Consulting Engineers
5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188

April 18, 2012
Revised June 17, 2013

AES Project No. W10119-E-04

SP-39-12
FINAL COMPS.

W10119-E-04_Stormwater Management Report.doc

AES
CONSULTING ENGINEERS

DRY POND TO WETLAND CONVERSION

TABLE OF CONTENTS

STORM WATER NARRATIVE

F-2 B-3|B-4

PROJECT DESCRIPTION
This project involves the conversion of an existing dry pond into a constructed wetlands BMP at Stonehouse Elementary.

EXISTING SITE CONDITIONS
The existing site is a dry pond located in the northern corner of the Stonehouse Elementary School property.

ADJACENT PROPERTIES
The project is bordered on the northeast and northwest by wooded areas, on the southwest by grass field, and on the south by the school parking lot.

SOILS
The project area consists of 11C-Craven-Uchee complex and 19B Kempsville-Emporia Fine Sandy Loam with slopes ranging from 2 to 50 percent.

CRITICAL EROSION AREAS
There are areas of 25% slope impacts in this project. These amount to 0.166 acres or 25.9% of the total disturbed area.

STORMWATER MANAGEMENT & WATER QUALITY
Stormwater Management and water quality will be attained for this project through the use of the proposed Constructed Wetlands. The constructed wetlands consist of forebays at the locations of incoming pipes, deep pools that will remain wet, and the normal pool volume. Sizing of the facility is based on the Treatment Volume of 12,894 cubic feet. Of this volume, deep pool should provide 25% (3,224 cubic feet) and the normal pool should provide 50% (6,447 cubic feet). According to the Virginia DCR Stormwater Design Specification No. 13, deep pools consist of the deep wet pool, micropool, and forebay areas.

The proposed wetlands will provide 11,538 cubic feet of total treatment volume. The deep pools have a volume of 3,165 cubic feet. The normal pool includes the volume provided under elevation 83.22 which totals 5,120 cubic feet.

The channel protection volume required for the drainage area to the pond is 20,720 cubic feet. The channel protection volume provided is 24,609 cubic feet at the riser elevation of 85.26. An emergency spillway is provided at elevation 87.00 which will be utilized during 100-year storm events. SCPV

Rip-rap outlet protection is provided at both the outfalls of the incoming pipes in the proposed wetlands. It is also provided at the outfall of the proposed storm system.

RESULTS & CONCLUSIONS

Due to the constraints of the existing pond design full compliance with the DCR technical specifications for a constructed wetlands can not be achieved. Specifically the 1 year Channel Protection Volume is provided, but at a depth greater than the 1 foot recommended. All other requirements regarding volume to be provided in the wet pool and extended detention volume are provided. Based on this analysis the new facility will have a higher pollutant removal efficiency as a constructed wetlands than the existing dry extended detention facility located on site. Therefore this facility as designed will improve the water quality benefits from the site, and maintain the water quantity controls consistent with the original facility.

GOOD BENEFIT

Stonehouse Elementary School Dam

CALCULATION FOR SCS HYDROGRAPH GENERATION AND CHANNEL PROTECTION

FOR Existing Pond

Project No. W10119-E-04

25-Feb-11

I. **PRE-DEVELOPMENT CONDITIONS TO POINT OF CONCERN**

A. Pre-Development Drainage Area to Point of Concern = **7.39** Acres

B. Pre-development Land Use, Soil Classification and Calculation of Composite Curve Number

	Soil Type	Soil Hydrologic Group	Pre-Development Land Use	Area of Land Use (in Acres)	Curve Number for Land Use (CN)	Adjusted (CN)
1)	**Composite B/C Soils**	C	**Open Space (Good)**	**4.59**	74	340
2)	**Impervious Cover**	N/A	**Impervious Cover**	**2.8**	98	274
3)					0	0
4)					0	0
5)					0	0
6)					0	0
7)					0	0
	Totals =			7.39		614
	Composite CN =					83

C. Pre-Development Time of Concentration Calculations

1) Overland Flow (maximum 300 feet)

Surface description (table 5-7)	**Dense grasses**	
Manning's roughness coefficient., n (table 5-7)	0.24	
Length of overland flow, L	**50**	Feet
2-year 24-hour rainfall, P2	3.6	inches
Average slope of overland flow , s	**0.03**	feet per foot
Travel time, Tt = (0.007*(n*L)^0.8)/(P2^0.5*s^0.4)	0.11	hours

2) Shallow concentrated flow (maximum 300 feet)

Surface description, paved or unpaved	unpaved	
Length of shallow concentrated flow, L	**300**	Feet
Average slope of shallow concentrated flow, s	**0.02**	feet per foot
Average velocity, v	**1.0**	feet per second
Travel time, Tt = L/(3600*v)	0.08	hours

3) Channel or Pipe Flow

69	Length of channel flow, L	**550**	Feet
	Average velocity of channel flow, v	**1.5**	feet per second
	Travel time, Tt = L/(3600*v)	0.10	hours
	Total Time of Concentration =	0.29	hours
		or 18	minutes

B-3 10pt 1" per imperv. acre
Forebay, bench, high/low, FB
@ 7.39Ac = 25,454 cf

B-4 6pt 1" per imperv. acre
For HWT/groundwater cases

DA = 7.39 AC.
IMPERV. 2.8 AC.
CN = 83
TC = 18 min.

AES
CONSULTING ENGINEERS

Project:	Stonehouse Dam
Project No.:	W10119-04
Subject:	1 yr-24 hr Drawdown Calculation
	Kerplunk Method
Date:	3/9/2012 (Revised: 5/28/2013)
Calculated By:	GVC / REC

Channel Protection Volume:

Drainage Area	=	7.39	Acres ✓
Runoff Curve No.	=	83	✓
1-Yr, 24-Hr Storm Volume	=	2.8	inches ✓

Direct Runoff (From TR55 Equations 2-3 & 2-4)
Q = 1.29 inches

Channel Protection Volume = DA x Q x 60% (Virginia Stormwater Managment Handbook section 5-6.2 - Method 2)
SCP ✓
Vcp = 5.71 Ac-in = 20,720 cubic feet

Determine Volume of Pond by Contour (starting at invert of low flow orifice):

Elevation	Incremental Depth	Area (sq. ft.)	Volume (cu. ft.)	Volume (cu. yd.)	Sum Volume (cu. ft.)	Sum Volume (cu. yd.)	Incremental Avg Head[1] (feet)	Incremental Avg Flow[1] (feet)	Incremental Drawdown Time[1] (hrs)
82.2	0.0	4,209	-	-	-	-			
83.0	0.8	7,787	4,678	173	4,678	173	0.39	0.12	10.68
84.0	1.0	8,684	8,236	305	12,914	478	1.28	0.25	9.01
85.0	1.0	9,617	9,151	339	22,064	817	2.21	0.34	6.36
86.0	1.0	10,595	10,106	374	32,170	1,191	0.00	0.00	0.00
87.0	1.0	11,973	11,284	418	43,454	1,609	0.00	0.00	0.00
88.0	1.0	14,395	13,184	488	56,638	2,098	0.00	0.00	0.00
	0.0		-	-	56,638	2,098	0.00	0.00	0.00
	0.0		-	-	56,638	2,098	0.00	0.00	0.00
	0.0		-	-	56,638	2,098	0.00	0.00	0.00
	0.0		-	-	56,638	2,098	0.00	0.00	0.00
		Total	56,638	2,098					26.05

[1] Incremental values computed from Channel Protection Volume Elevation

Elevation of Low Flow Orifice Invert	=	82.22	feet
Elevation of 1-yr, 24-hr Storage Volume	=	84.85	feet
Size of Orifice	=	3.00	inches *
Total Average Drawdown Time	=	26.05	hrs

NOTE: MAINTAINING EXISTING LOW FLOW ORIFICE SIZE

72 hour OK.

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2012 by Autodesk, Inc. v9

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)							Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	-----	10.95	15.93	------	------	33.23	------	------	50.07	Existing Drainage Area
2	Reservoir	1	0.634	1.425	------	------	15.81	------	------	41.50	Existing Pond Routed
4	Reservoir	1	0.382	1.451	------	------	16.47	------	------	42.29	Route 3 orifce

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2012 by Autodesk, Inc. v9

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	10.95	2	724	34,533	-----	-----	-----	Existing Drainage Area
2	Reservoir	0.634	2	838	34,496	1	84.67	24,054	Existing Pond Routed
4	Reservoir	0.382	2	962	34,489	1	84.96	26,771	Route 3 orifce

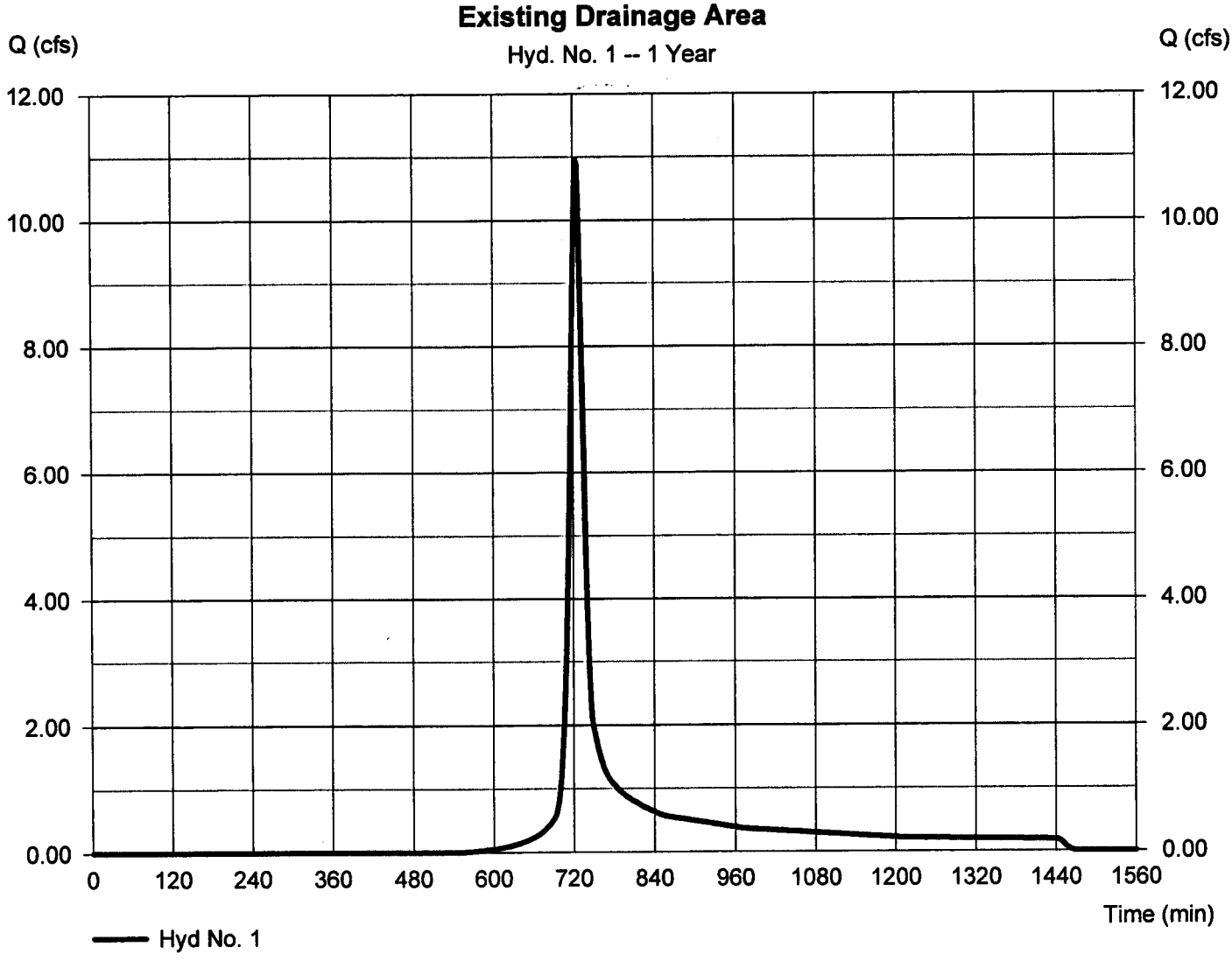
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2012 by Autodesk, Inc. v9 — Monday, 00 17, 2013

Hyd. No. 1

Existing Drainage Area

Hydrograph type	= SCS Runoff	Peak discharge	= 10.95 cfs
Storm frequency	= 1 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 34,533 cuft
Drainage area	= 7.390 ac	Curve number	= 83
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	=	Time of conc. (Tc)	= 18.00 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

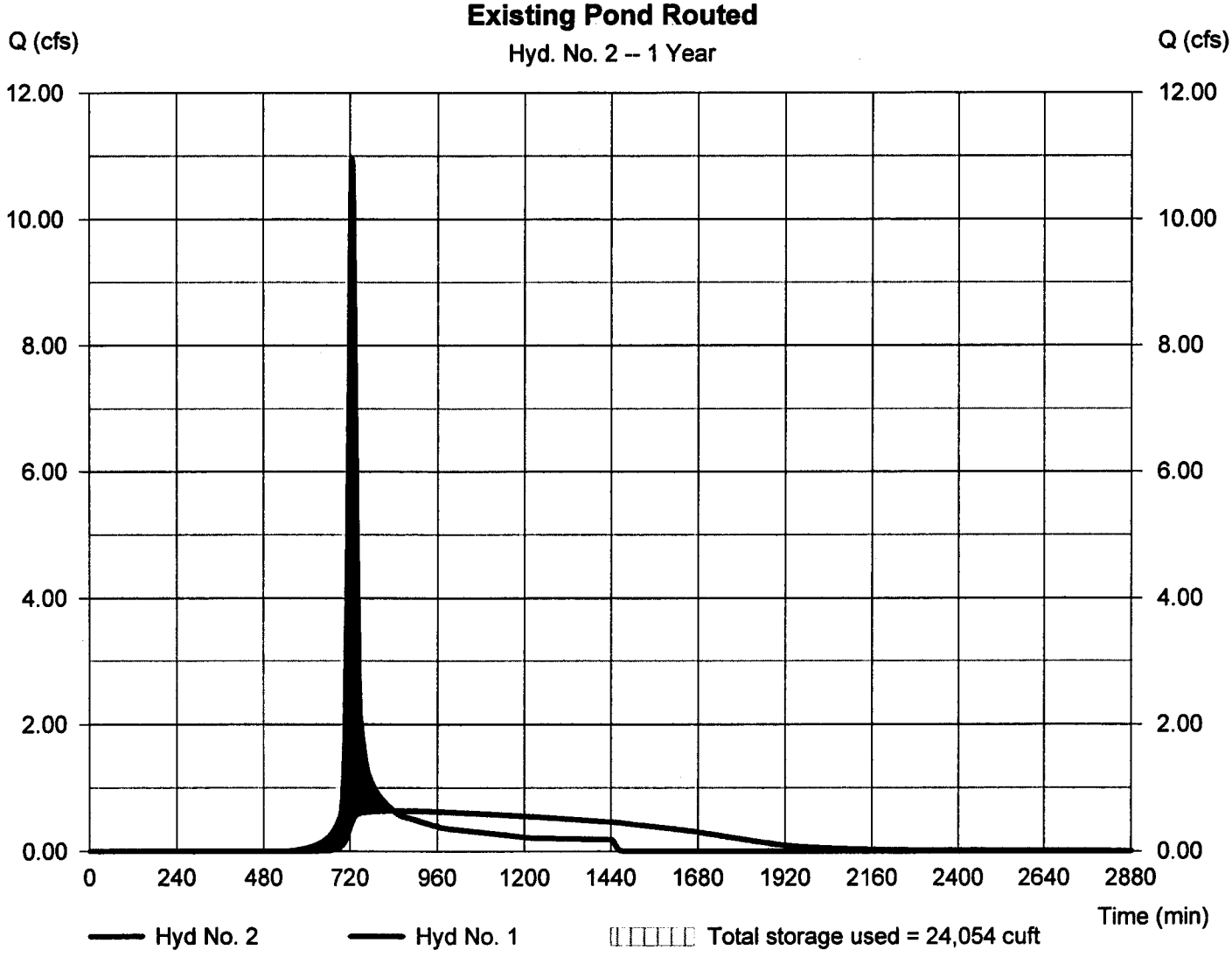
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2012 by Autodesk, Inc. v9 — Monday, 00 17, 2013

Hyd. No. 2

Existing Pond Routed

Hydrograph type	= Reservoir	Peak discharge	= 0.634 cfs
Storm frequency	= 1 yrs	Time to peak	= 838 min
Time interval	= 2 min	Hyd. volume	= 34,496 cuft
Inflow hyd. No.	= 1 - Existing Drainage Area	Max. Elevation	= 84.67 ft
Reservoir name	= Existing Pond	Max. Storage	= 24,054 cuft

Storage Indication method used. Wet pond routing start elevation = 82.20 ft.



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2012 by Autodesk, Inc. v9 — Monday, 00 17, 2013

Pond No. 1 - Existing Pond

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 78.72 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	78.72	304	0	0
1.00	79.72	719	497	497
2.00	80.72	1,235	965	1,462
3.00	81.72	1,851	1,532	2,995
3.28	82.00	4,209	826	3,821
4.28	83.00	7,787	5,906	9,727
5.28	84.00	8,684	8,231	17,958
6.28	85.00	9,617	9,146	27,103
7.28	86.00	10,595	10,101	37,204
8.28	87.00	11,973	11,276	48,480
9.28	88.00	14,395	13,164	61,644

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	4.00	0.00	0.00
Span (in)	= 24.00	4.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 79.06	82.22	0.00	0.00
Length (ft)	= 49.00	0.00	0.00	0.00
Slope (%)	= 3.63	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

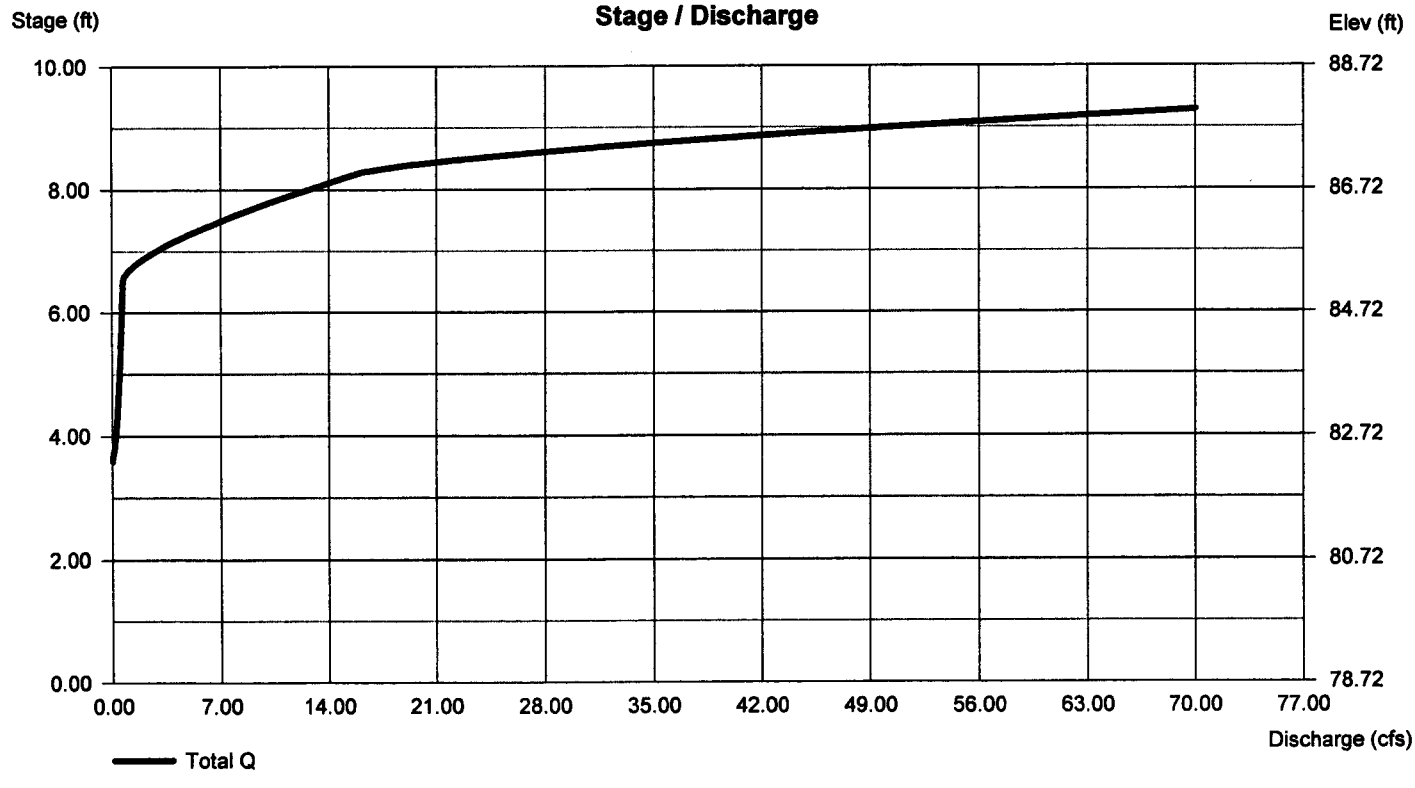
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 2.00	15.00	0.00	0.00
Crest El. (ft)	= 85.26	87.00	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= Rect	Broad	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Hydrograph Report

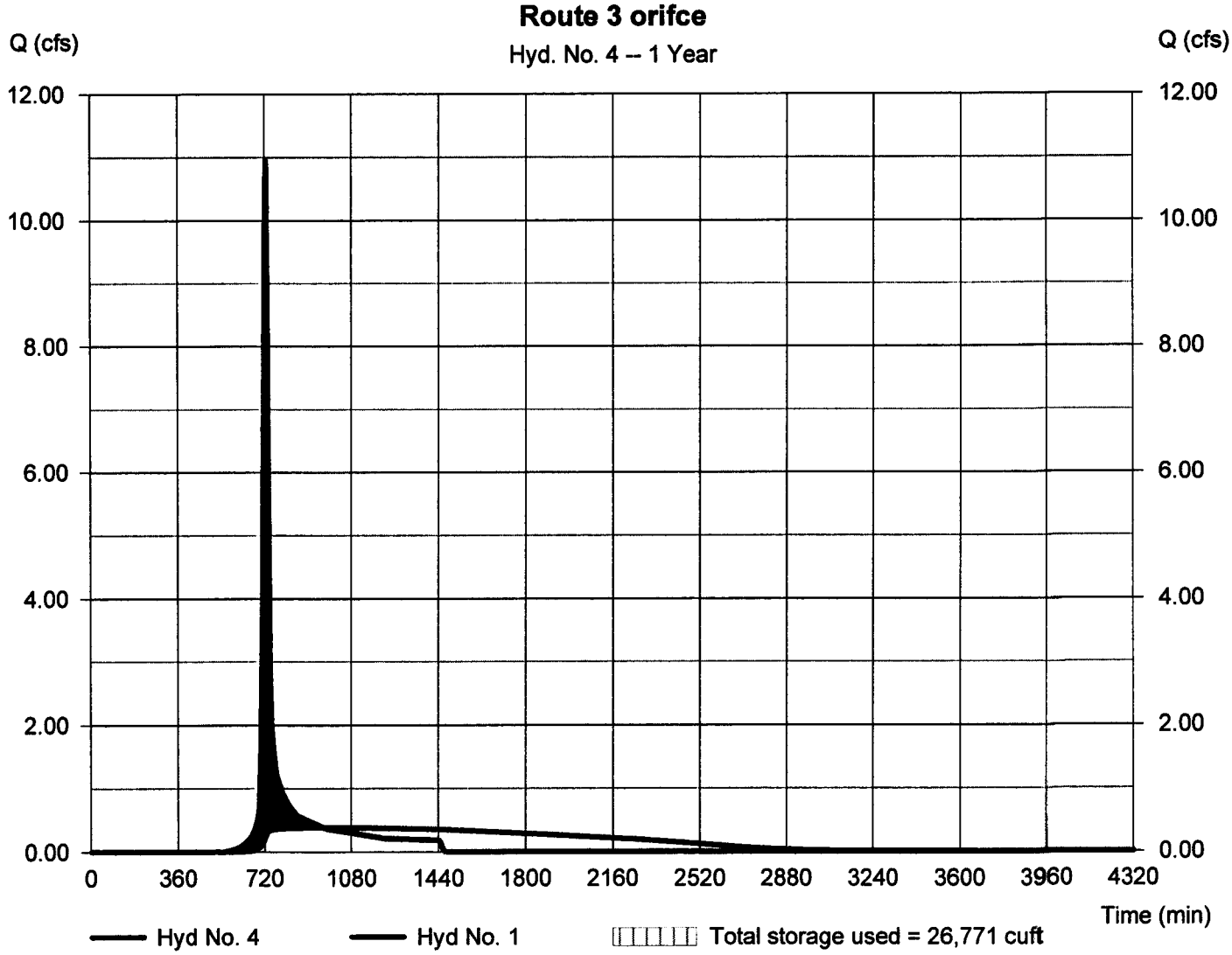
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2012 by Autodesk, Inc. v9 — Monday, 00 17, 2013

Hyd. No. 4

Route 3 orifce

Hydrograph type	= Reservoir	Peak discharge	= 0.382 cfs
Storm frequency	= 1 yrs	Time to peak	= 962 min
Time interval	= 2 min	Hyd. volume	= 34,489 cuft
Inflow hyd. No.	= 1 - Existing Drainage Area	Max. Elevation	= 84.96 ft
Reservoir name	= 3 orifice	Max. Storage	26,771 cuft

Storage Indication method used. Wet pond routing start elevation = 82.20 ft.



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2012 by Autodesk, Inc. v9 — Monday, 00 17, 2013

Pond No. 2 - 3 orifice

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 78.72 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	78.72	304	0	0
1.00	79.72	719	497	497
2.00	80.72	1,235	965	1,462
3.00	81.72	1,851	1,532	2,995
3.28	82.00	4,209	826	3,821
4.28	83.00	7,787	5,906	9,727
5.28	84.00	8,684	8,231	17,958
6.28	85.00	9,617	9,146	27,103
7.28	86.00	10,595	10,101	37,204
8.28	87.00	11,973	11,276	48,480
9.28	88.00	14,395	13,164	61,644

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	3.00	0.00	0.00
Span (in)	= 24.00	3.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 79.06	82.22	0.00	0.00
Length (ft)	= 49.00	0.00	0.00	0.00
Slope (%)	= 3.63	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

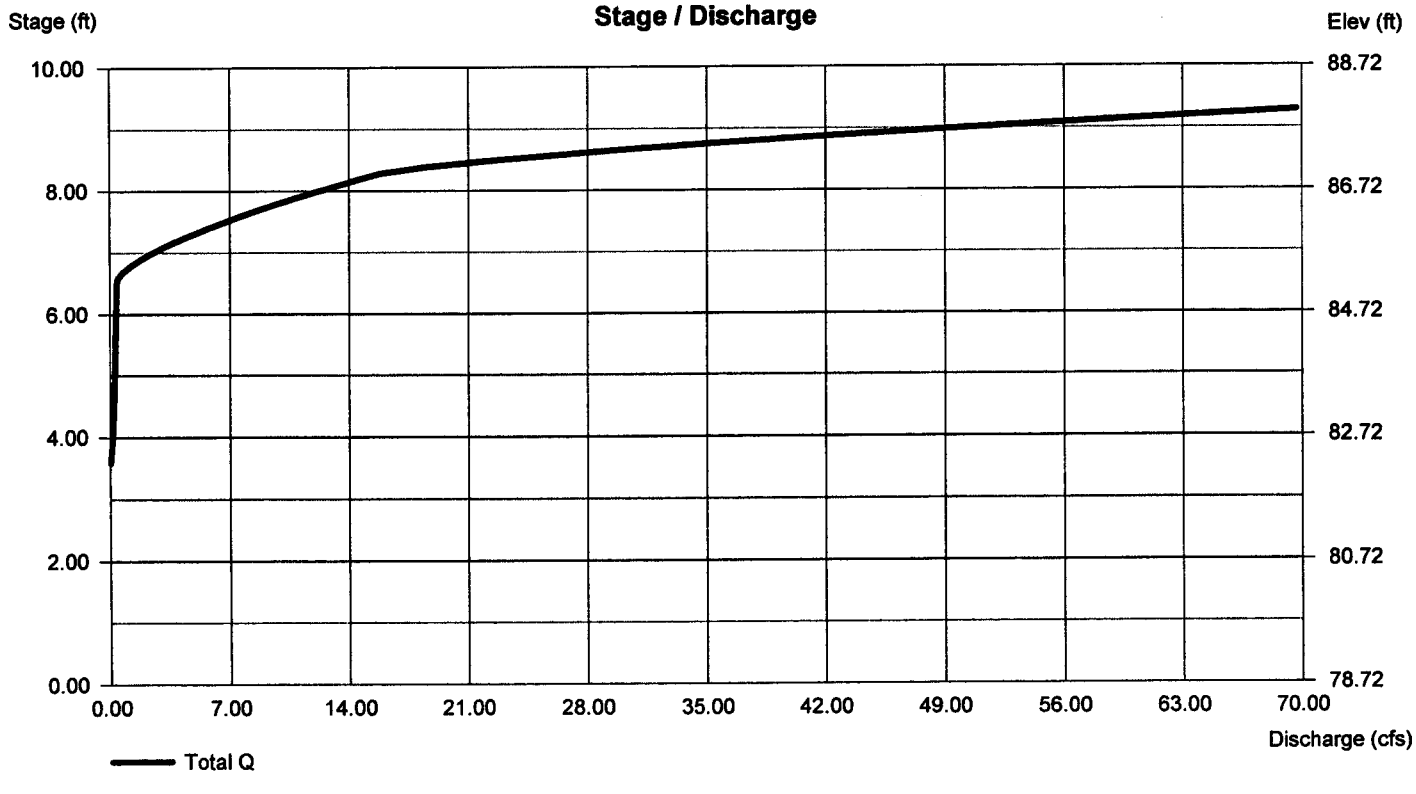
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 2.00	15.00	0.00	0.00
Crest El. (ft)	= 85.26	87.00	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= Rect	Broad	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2012 by Autodesk, Inc. v9

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	15.93	2	724	49,857	-----	-----	-----	Existing Drainage Area
2	Reservoir	1.425	2	782	49,820	1	85.48	31,929	Existing Pond Routed
4	Reservoir	1.451	2	780	49,813	1	85.55	32,615	Route 3 orifce

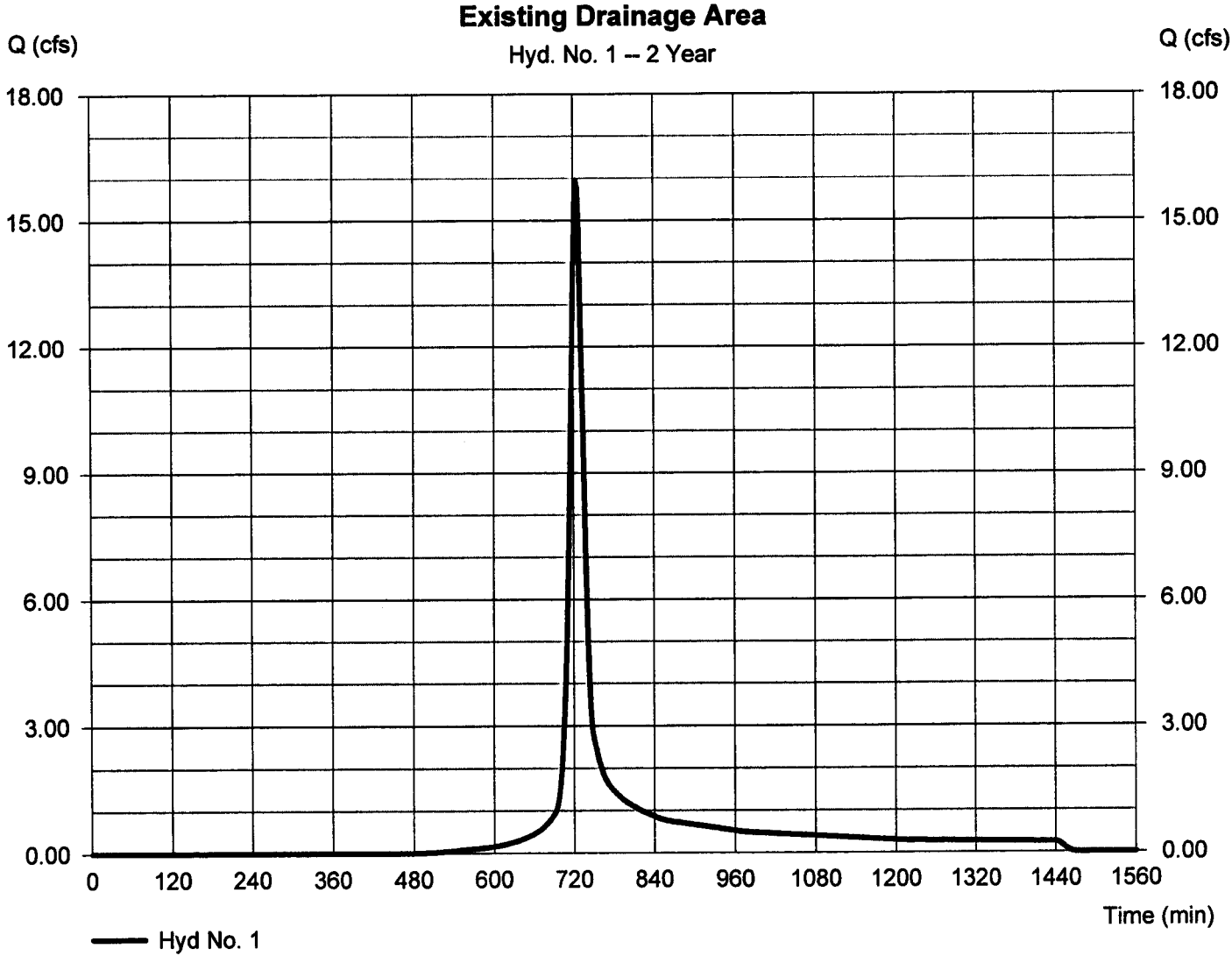
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2012 by Autodesk, Inc. v9 — Monday, 00 17, 2013

Hyd. No. 1

Existing Drainage Area

Hydrograph type	= SCS Runoff	Peak discharge	= 15.93 cfs
Storm frequency	= 2 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 49,857 cuft
Drainage area	= 7.390 ac	Curve number	= 83
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	=	Time of conc. (Tc)	= 18.00 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

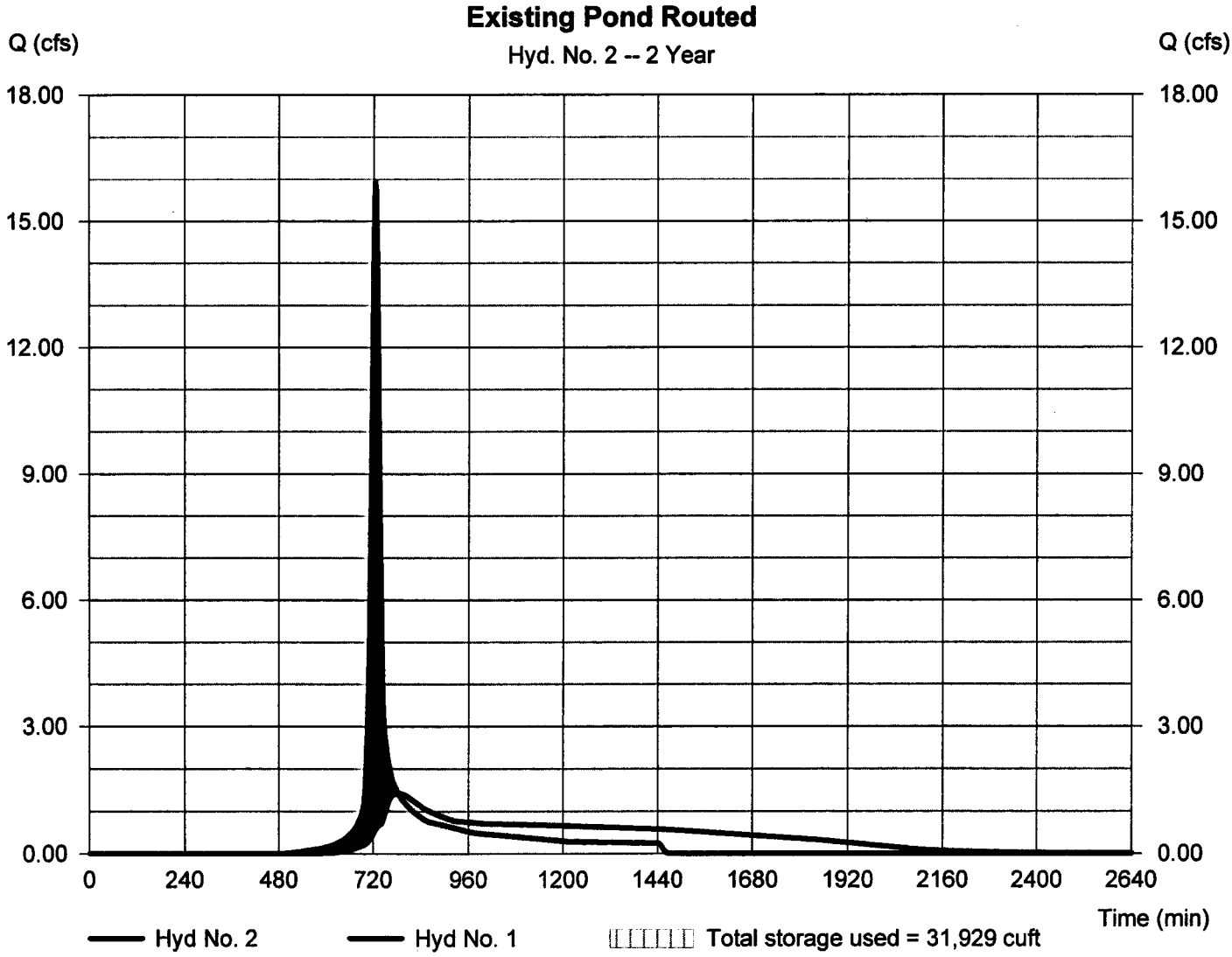
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2012 by Autodesk, Inc. v9 — Monday, 00 17, 2013

Hyd. No. 2

Existing Pond Routed

Hydrograph type	= Reservoir	Peak discharge	= 1.425 cfs
Storm frequency	= 2 yrs	Time to peak	= 782 min
Time interval	= 2 min	Hyd. volume	= 49,820 cuft
Inflow hyd. No.	= 1 - Existing Drainage Area	Max. Elevation	= 85.48 ft
Reservoir name	= Existing Pond	Max. Storage	= 31,929 cuft

Storage Indication method used. Wet pond routing start elevation = 82.20 ft.



Hydrograph Report

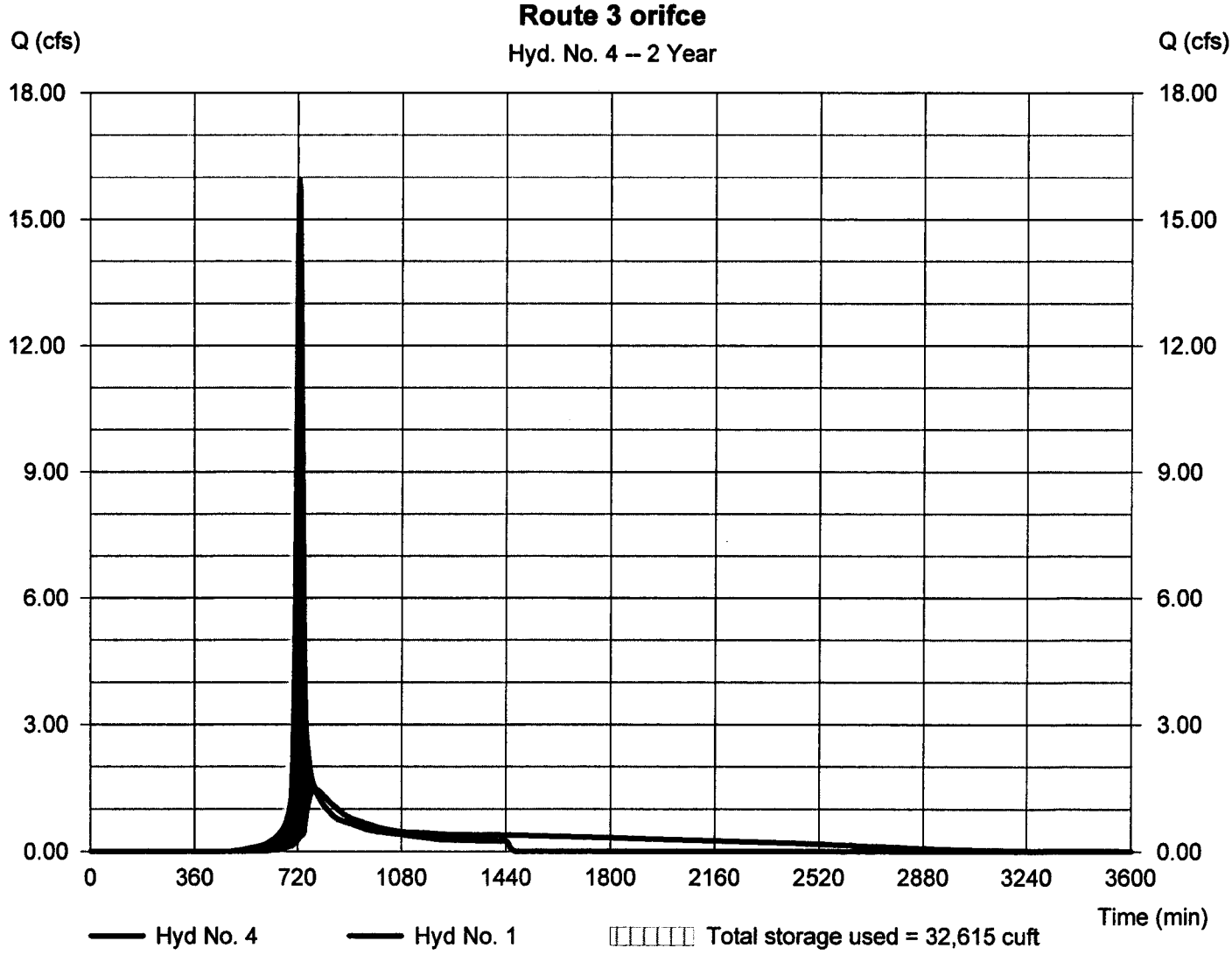
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2012 by Autodesk, Inc. v9 Monday, 00 17, 2013

Hyd. No. 4

Route 3 orifce

Hydrograph type	= Reservoir	Peak discharge	= 1.451 cfs
Storm frequency	= 2 yrs	Time to peak	= 780 min
Time interval	= 2 min	Hyd. volume	= 49,813 cuft
Inflow hyd. No.	= 1 - Existing Drainage Area	Max. Elevation	= 85.55 ft
Reservoir name	= 3 orifice	Max. Storage	= 32,615 cuft

Storage Indication method used. Wet pond routing start elevation = 82.20 ft.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2012 by Autodesk, Inc. v9

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	33.23	2	724	104,785	------	------	------	Existing Drainage Area
2	Reservoir	15.81	2	738	104,748	1	86.98	48,155	Existing Pond Routed
4	Reservoir	16.47	2	736	104,740	1	87.03	48,824	Route 3 orifce

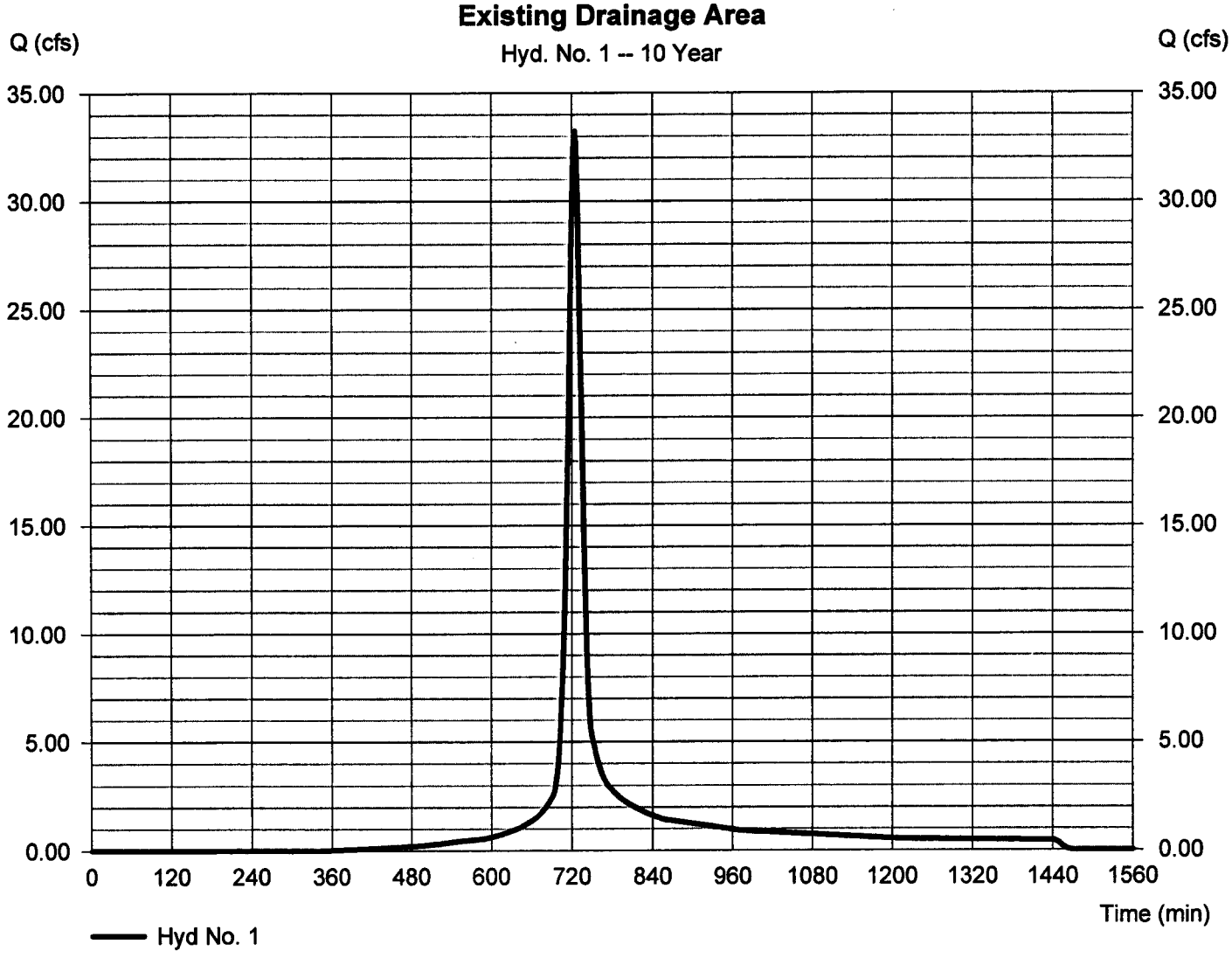
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2012 by Autodesk, Inc. v9 — Monday, 00 17, 2013

Hyd. No. 1

Existing Drainage Area

Hydrograph type	= SCS Runoff	Peak discharge	= 33.23 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 104,785 cuft
Drainage area	= 7.390 ac	Curve number	= 83
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	=	Time of conc. (Tc)	= 18.00 min
Total precip.	= 5.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

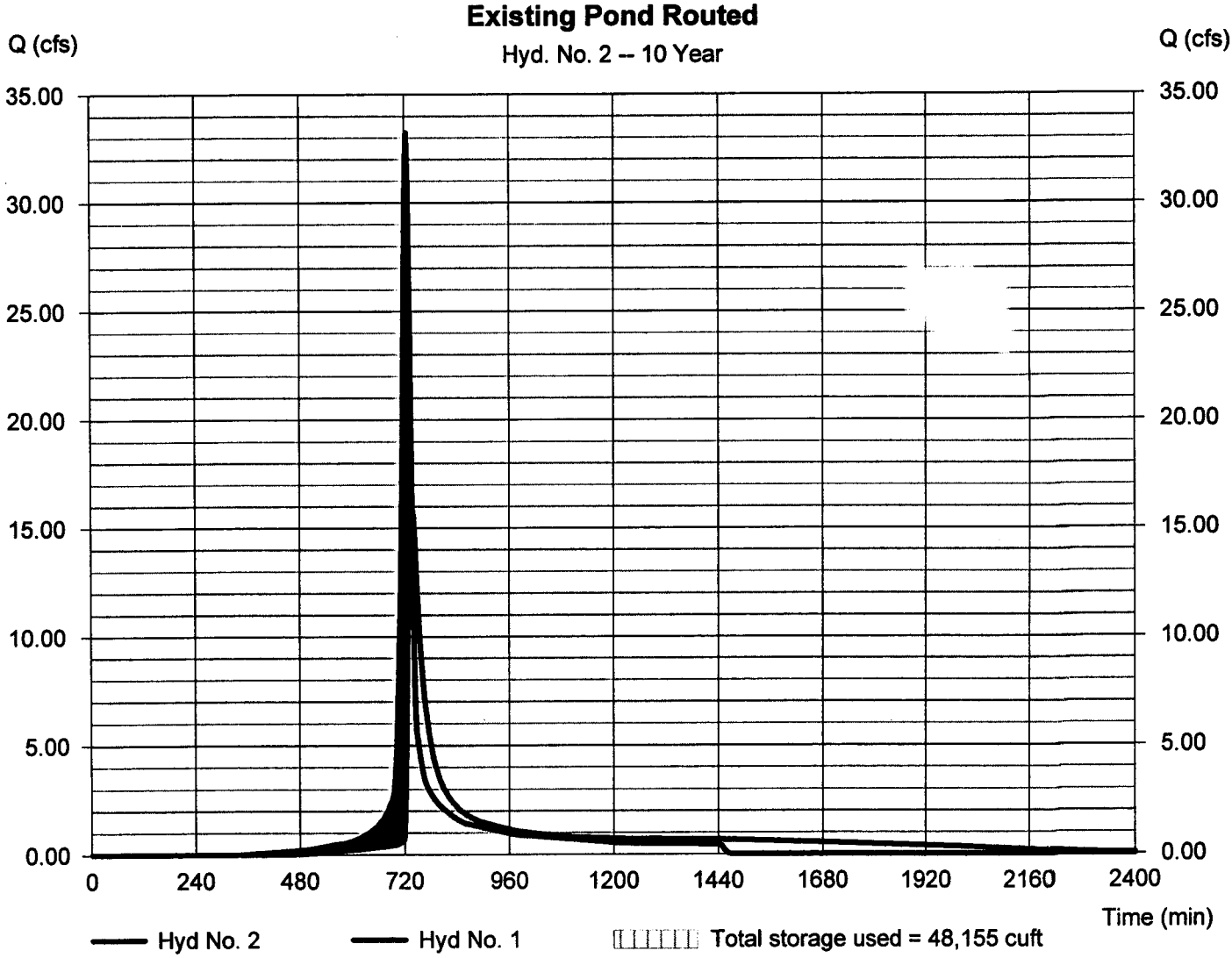
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2012 by Autodesk, Inc. v9 — Monday, 00 17, 2013

Hyd. No. 2

Existing Pond Routed

Hydrograph type	= Reservoir	Peak discharge	= 15.81 cfs
Storm frequency	= 10 yrs	Time to peak	= 738 min
Time interval	= 2 min	Hyd. volume	= 104,748 cuft
Inflow hyd. No.	= 1 - Existing Drainage Area	Max. Elevation	= 86.98 ft
Reservoir name	= Existing Pond	Max. Storage	= 48,155 cuft

Storage Indication method used. Wet pond routing start elevation = 82.20 ft.



Hydrograph Report

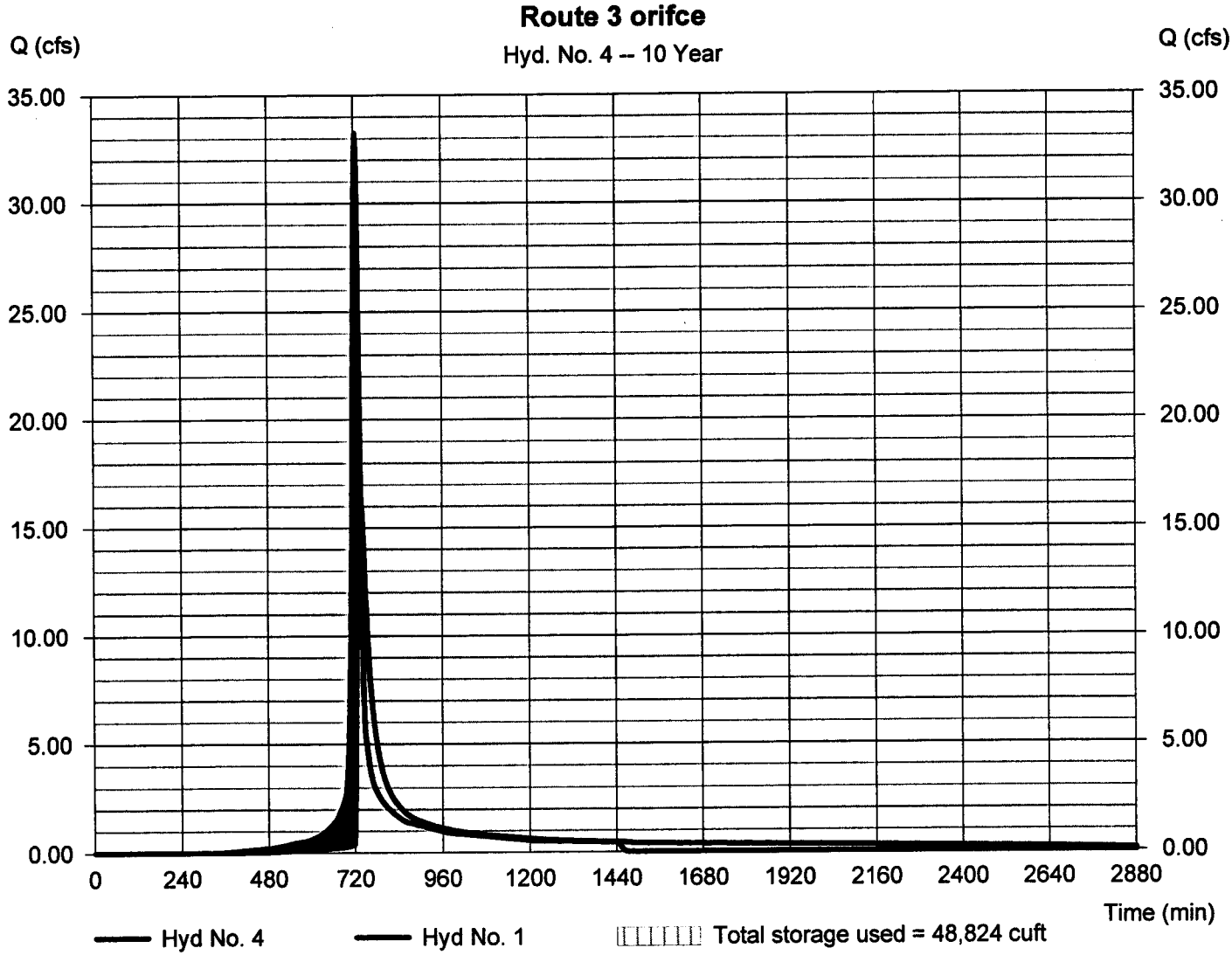
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2012 by Autodesk, Inc. v9 — Monday, 00 17, 2013

Hyd. No. 4

Route 3 orifce

Hydrograph type	= Reservoir	Peak discharge	= 16.47 cfs
Storm frequency	= 10 yrs	Time to peak	= 736 min
Time interval	= 2 min	Hyd. volume	= 104,740 cuft
Inflow hyd. No.	= 1 - Existing Drainage Area	Max. Elevation	= 87.03 ft
Reservoir name	= 3 orifice	Max. Storage	= 48,824 cuft

Storage Indication method used. Wet pond routing start elevation = 82.20 ft.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2012 by Autodesk, Inc. v9

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	50.07	2	724	160,348	-----	-----	-----	Existing Drainage Area
2	Reservoir	41.50	2	730	160,312	1	87.58	56,066	Existing Pond Routed
4	Reservoir	42.29	2	730	160,303	1	87.60	56,333	Route 3 orifce

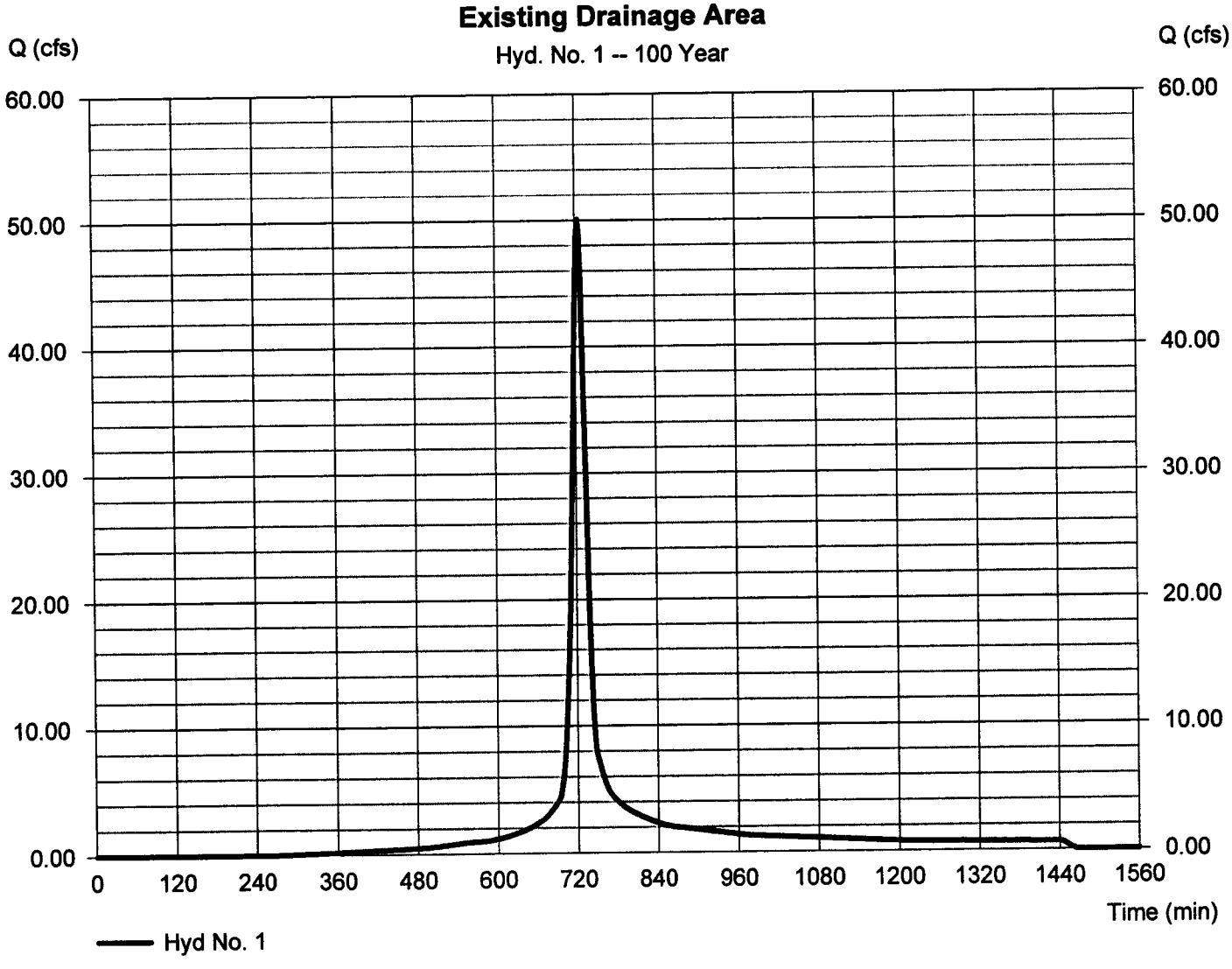
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2012 by Autodesk, Inc. v9 — Monday, 00 17, 2013

Hyd. No. 1

Existing Drainage Area

Hydrograph type	= SCS Runoff	Peak discharge	= 50.07 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 160,348 cuft
Drainage area	= 7.390 ac	Curve number	= 83
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	=	Time of conc. (Tc)	= 18.00 min
Total precip.	= 8.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

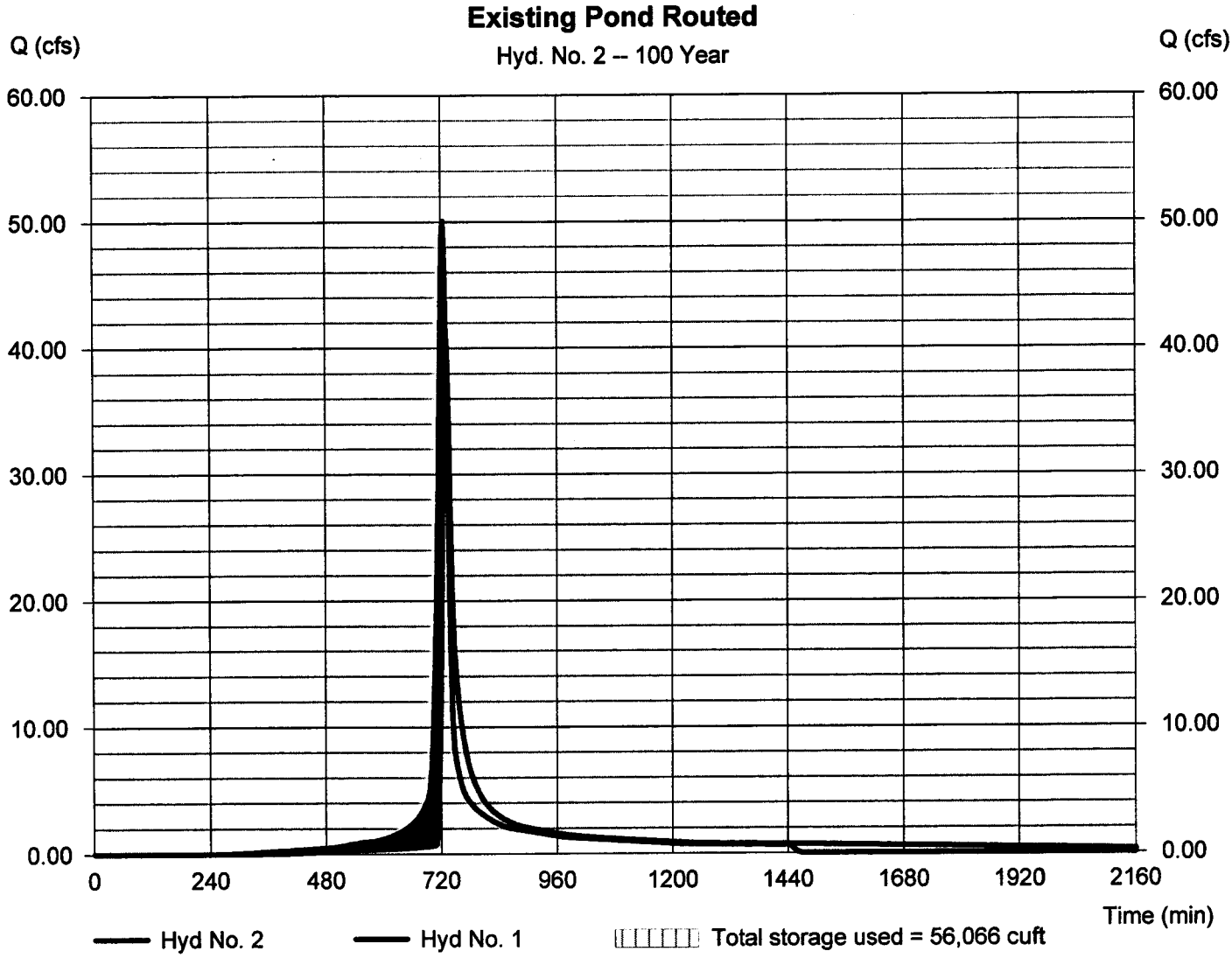
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2012 by Autodesk, Inc. v9 — Monday, 00 17, 2013

Hyd. No. 2

Existing Pond Routed

Hydrograph type	= Reservoir	Peak discharge	= 41.50 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 160,312 cuft
Inflow hyd. No.	= 1 - Existing Drainage Area	Max. Elevation	= 87.58 ft
Reservoir name	= Existing Pond	Max. Storage	= 56,066 cuft

Storage Indication method used. Wet pond routing start elevation = 82.20 ft.



Hydrograph Report

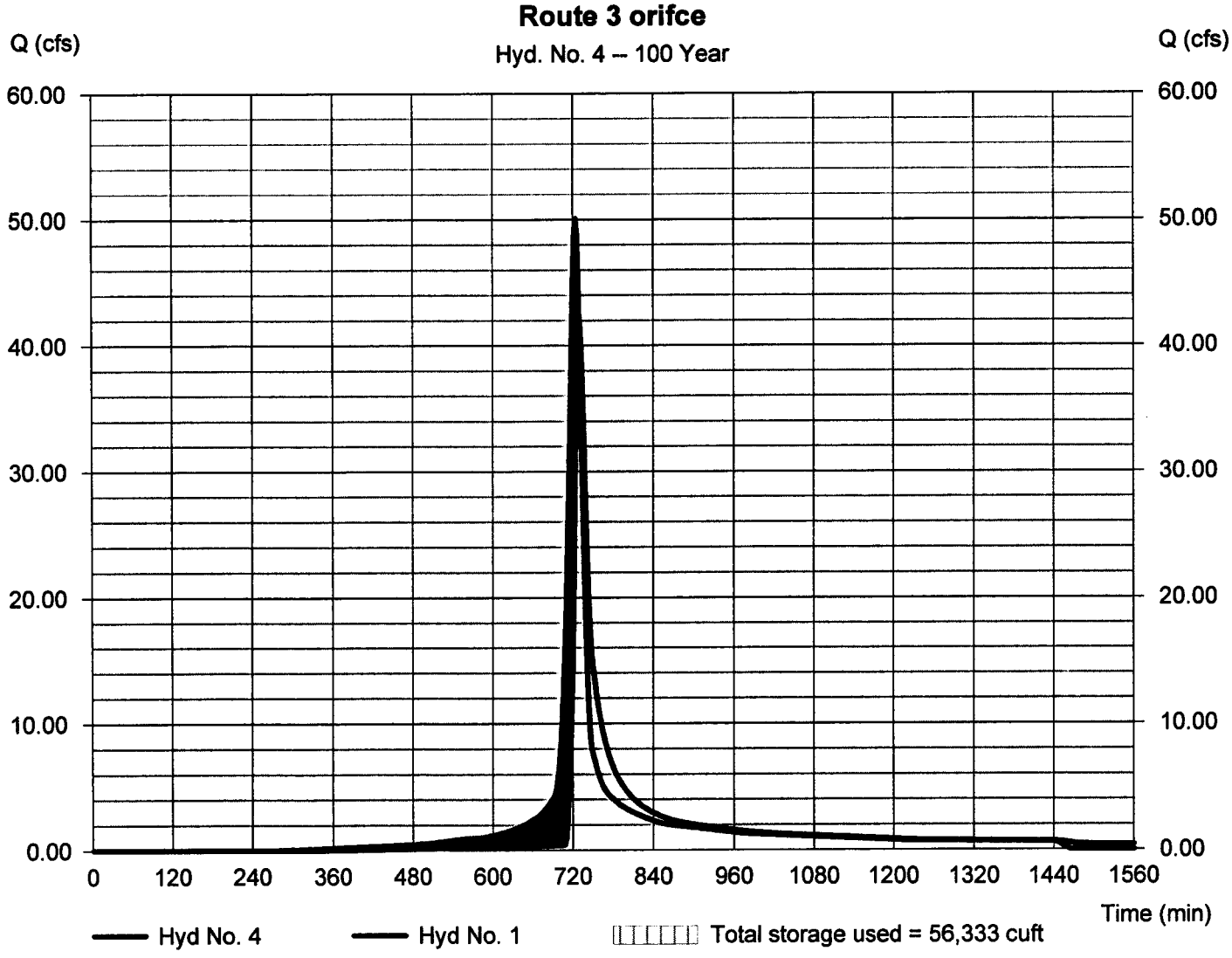
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2012 by Autodesk, Inc. v9 Monday, 00 17, 2013

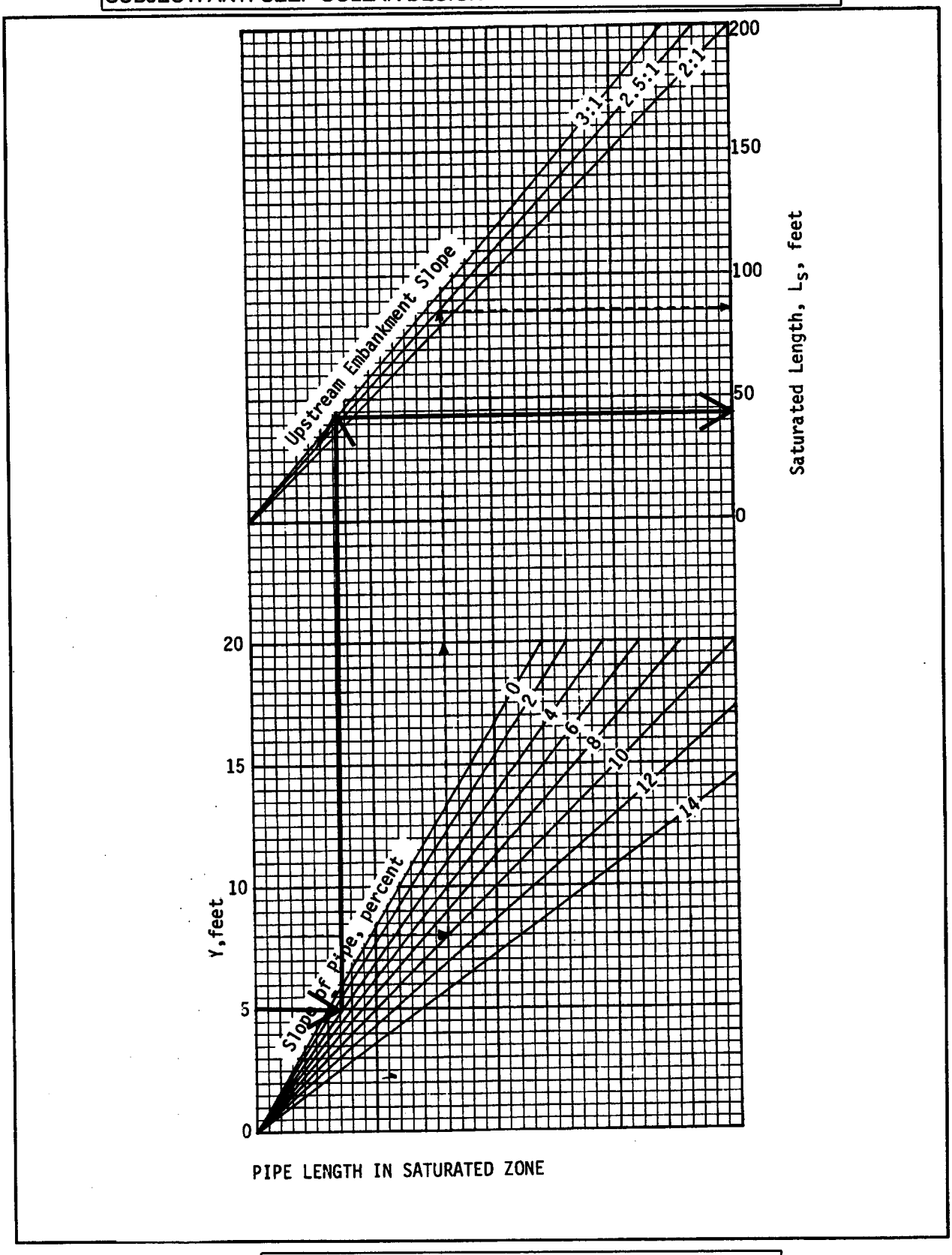
Hyd. No. 4

Route 3 orifce

Hydrograph type	= Reservoir	Peak discharge	= 42.29 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 160,303 cuft
Inflow hyd. No.	= 1 - Existing Drainage Area	Max. Elevation	= 87.60 ft
Reservoir name	= 3 orifice	Max. Storage	= 56,333 cuft

Storage Indication method used. Wet pond routing start elevation = 82.20 ft.

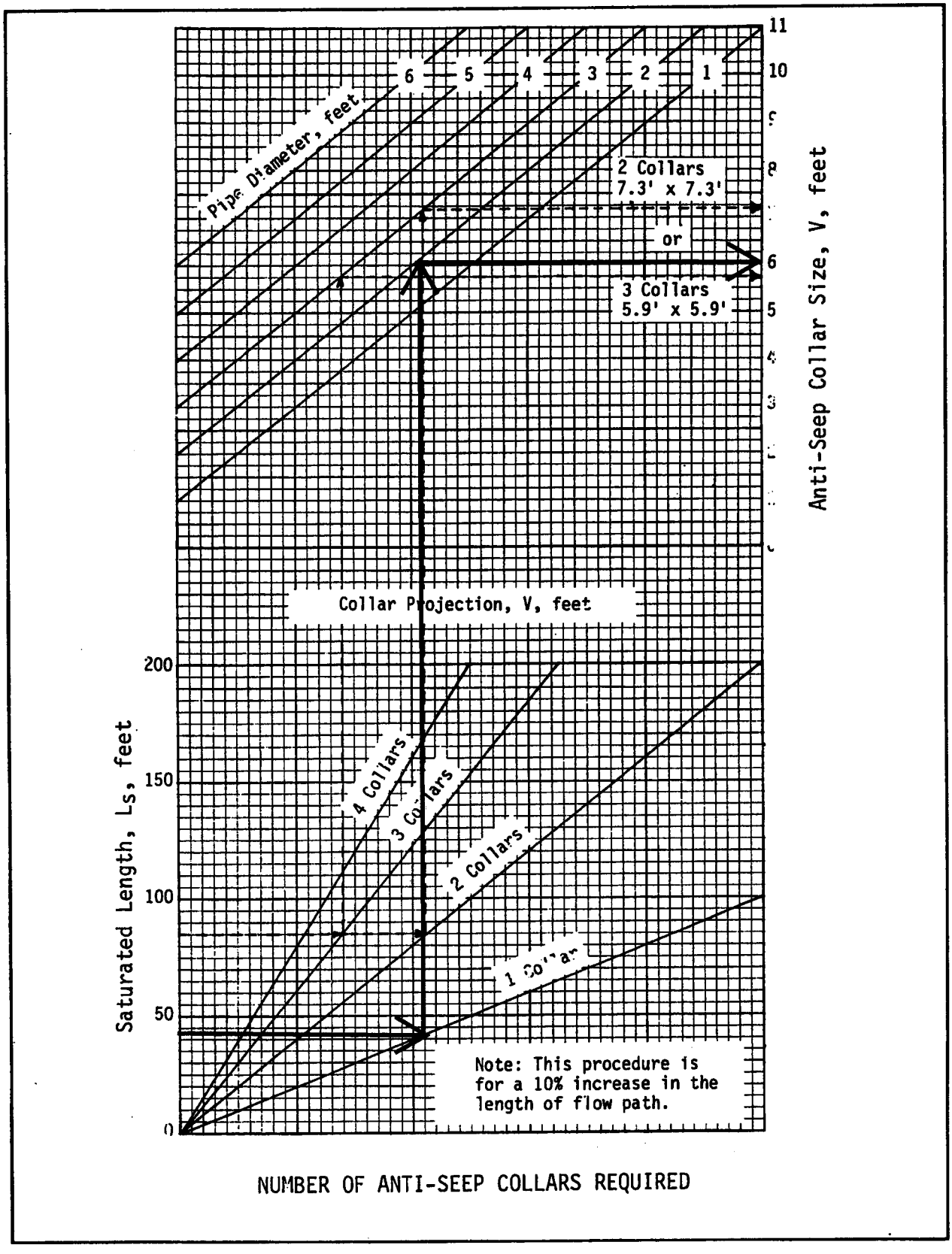




Source: USDA-SCS

Depth of water at principal spillway crest (Y) =	5 ft.
Slope of upstream face of embankment (Z) =	3 :1.
Slope of principal spillway barrel (Sb) =	3.79 %

Plate 3.14-11



Source: USDA-SCS

Number of collars required = 1
Dimensions = 6'x6'

Plate 3.14-12

AES
CONSULTING ENGINEERS

Project:	**Stonehouse Dam**
Project No.:	**W10119-E-04**
Subject:	**Riprap Basin For Circular Culvert**
Date:	**9/24/2012**
Calculated By:	**GVC**

Hydraulic Design of Energy Dissipators for Culverts and Channels
Hydraulic Engineering Circular No. 14, Third Edition
U.S. Department of Transportation Federal Highway Administration - July 2006

Outfall Description: **BMP Outfall**

Pipe Diameter (D) or (W_o) = **2.00** FT.

Flow (Q) = **40.67** CFS

Tailwater Depth (TW) = **1.50** FT.

Determine brink depth (y_o):

$$(K_u)\frac{Q}{D^{2.5}} = (1)\frac{40.67}{5.66} = 7.19$$

$$\frac{TW}{D} = \frac{1.50}{2.00} = 0.75$$

y_o / D = **0.74** From Figure 3.4

y_o = y_o / D **0.74** x D **2.00** = **1.48** FT.

Determine culvert outlet velocity (V_o):

$$\frac{TW}{y_o} = \frac{1.50}{1.48} = 1.014$$

A / D^2 = **0.6231** From Table B.2 where y_o / D = d / D

A = A / D^2 **0.6231** x D^2 **4.00** = **2.49** SF

V_o = Q **40.7** ÷ A **2.49** = **16.3** FT/S

Determine Froude number (Fr):

$y_e = (A / 2)^{1/2}$ = **1.12** FT.

$Fr = V_o / [(32.2)(y_e)]^{1/2}$ = **2.72**

Try d_{50} / y_e = **0.45** d_{50} = **0.45** x **1.12** = **0.50** FT. or **6.0** IN.

Tailwater Parameter, C_o Equation 10.2

TW / y_e = **1.50** ÷ **1.12** = **1.34**

$TW / y_e < 0.75$ C_o = 1.4

$0.75 < TW / y_e < 1.0$ C_o = $4.0 (TW/y_e) - 1.6$

= 4.0 (**1.34**) - 1.6 = **3.77**

$1.0 < TW / y_e$ C_o = 2.4

h_s / y_e = 0.86 $(d_{50} / y_e)^{-0.55}$ (Fr) - C_o Equation 10.1

h_s / y_e = 0.86 (**0.45**)$^{-0.55}$ (**2.72**) - **2.40**

h_s / y_e = **1.2313**

h_s = **1.2313** x **1.12** = **1.37** FT.

Check

hs / d_{50} = **2.74** ≥ 2 OK

d_{50} / y_e = **0.45** ≥ 0.1 OK

Riprap Basin Size

Length of Dissipator Pool

L_s = 10 x h_s = **13.7** FT.

or L_s = 3 x W_o = **6.0** FT. Use Larger Value L_s = **13.7** FT.

Total Length

L_B = 15 x h_s = **20.6** FT.

or L_B = 4 x W_o = **8.0** FT. Use Larger Value L_B = **20.6** FT.

Width of Apron

W_B = W_o + 2 (L_B/3) = **15.7** FT.

Length of Apron

L_A = L_B - L_S

= **20.6** - **13.7** = **6.9** FT.

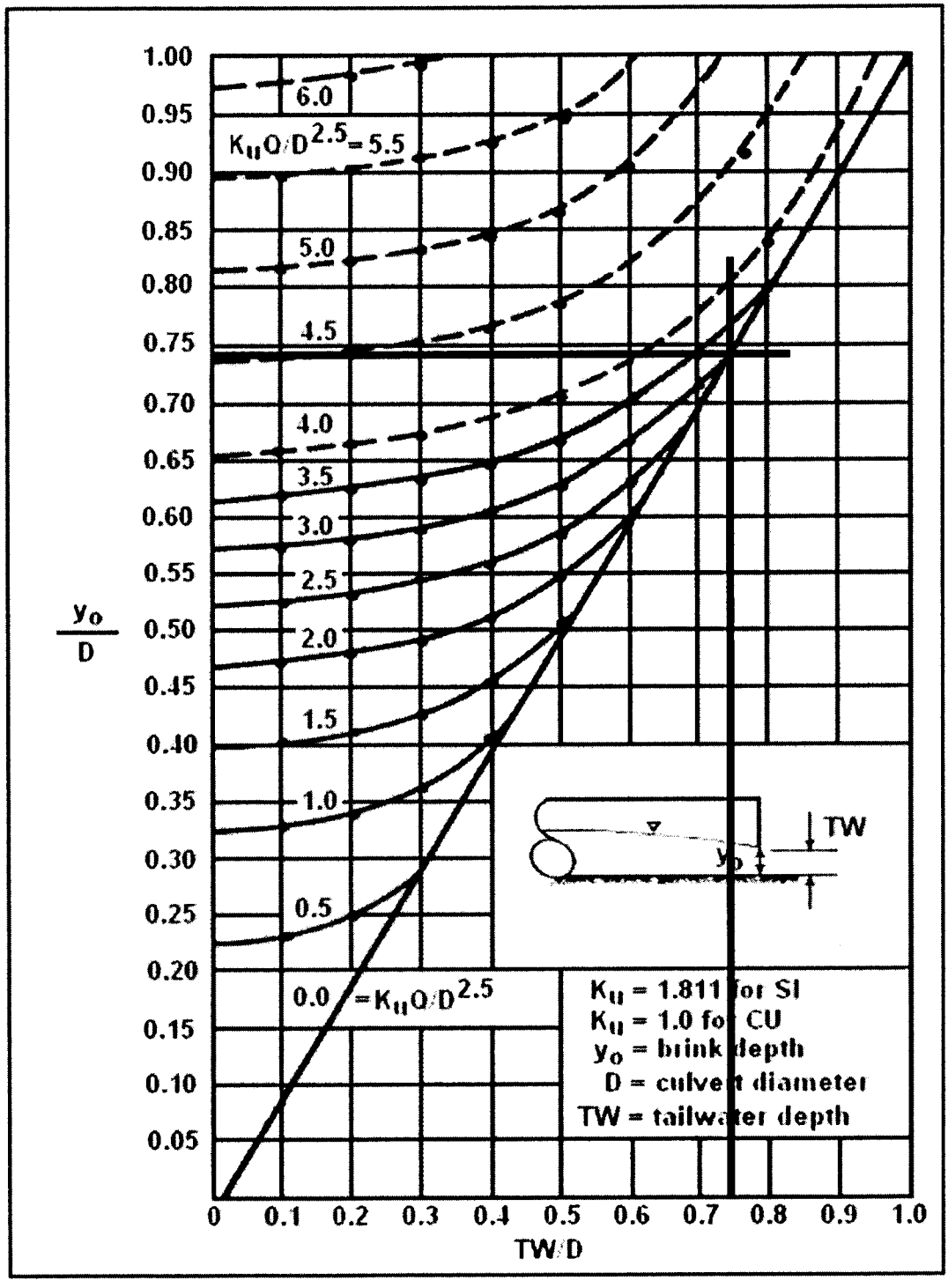


Figure 3.4. Dimensionless Rating Curves for the Outlets of Circular Culverts on Horizontal and Mild Slopes (Simons, 1970)

Table B.2. Uniform Flow in Circular Sections Flowing Partly Full

y/D	A/D^2	R/D	$\frac{(\alpha Qn)}{(D^{8/3} S^{1/2})}$	$\frac{(\alpha Qn)}{(y^{8/3} S^{1/2})}$	y/D	A/D^2	R/D	$\frac{(\alpha Qn)}{(D^{8/3} S^{1/2})}$	$\frac{(\alpha Qn)}{(y^{8/3} S^{1/2})}$
0.01	0.0013	0.0066	0.00007	15.04	0.51	0.4027	0.2531	0.239	1.442
0.02	0.0037	0.0132	0.00031	10.57	0.52	0.4127	0.2562	0.247	0.415
0.03	0.0069	0.0197	0.00074	8.56	0.53	0.4227	0.2592	0.255	1.388
0.04	0.0105	0.0262	0.00138	7.38	0.54	0.4327	0.2621	0.263	1.362
0.05	0.0147	0.0325	0.00222	6.55	0.55	0.4426	0.2649	0.271	1.336
0.06	0.0192	0.0389	0.00328	5.95	0.56	0.4526	0.2676	0.279	1.311
0.07	0.0294	0.0451	0.00455	5.47	0.57	0.1626	0.2703	0.287	1.286
0.08	0.0350	0.0513	0.00604	5.09	0.58	0.4724	0.2728	0.295	1.262
0.09	0.0378	0.0575	0.00775	4.76	0.59	0.4822	0.2753	0.303	1.238
0.10	0.0409	0.0635	0.0097	4.49	0.60	0.4920	0.2776	0.311	1.215
0.11	0.0470	0.0695	0.0118	4.25	0.61	0.5018	0.2799	0.319	1.192
0.12	0.0534	0.0755	0.0142	4.04	0.62	0.5115	0.2821	0.327	1.170
0.13	0.0600	0.0813	0.0167	3.86	0.63	0.5212	0.2842	0.335	1.148
0.14	0.0668	0.0871	0.0195	3.69	0.64	0.5308	0.2862	0.343	1.126
0.15	0.0739	0.0929	0.0225	3.54	0.65	0.5405	0.2988	0.350	1.105
0.16	0.0811	0.0985	0.0257	3.41	0.66	0.5499	0.2900	0.358	1.084
0.17	0.0885	0.1042	0.0291	3.28	0.67	0.5594	0.2917	0.366	1.064
0.18	0.0961	0.1097	0.0327	3.17	0.68	0.5687	0.2933	0.373	1.044
0.19	0.0139	0.1152	0.0365	3.06	0.69	0.5780	0.2948	0.380	1.024
0.20	0.1118	0.1206	0.0406	2.96	0.70	0.5872	0.2962	0.388	1.004
0.21	0.1199	0.1259	0.0448	2.87	0.71	0.5964	0.2975	0.395	0.985
0.22	0.1281	0.1312	0.0492	2.79	0.72	0.6054	0.2987	0.402	0.965
0.23	0.1365	0.1364	0.0537	2.71	0.73	0.6143	0.2998	0.409	0.947
0.24	0.1449	0.1416	0.0585	2.63	0.74	0.6231	0.3008	0.416	0.928
0.25	0.1535	0.1466	0.0634	2.56	0.75	0.6319	0.3042	0.422	0.910
0.26	0.1623	0.1516	0.0686	2.49	0.76	0.6405	0.3043	0.429	0.891
0.27	0.1711	0.1566	0.0739	2.42	0.77	0.6489	0.3043	0.435	0.873
0.28	0.1800	0.1614	0.0793	2.36	0.78	0.6573	0.3041	0.441	0.856
0.29	0.1890	0.1662	0.0849	2.30	0.79	0.6655	0.3039	0.447	0.838
0.30	0.1982	0.1709	0.0907	2.25	0.80	0.6736	0.3042	0.453	0.821
0.31	0.2074	0.1756	0.0966	2.20	0.81	0.6815	0.3043	0.458	0.804
0.32	0.2167	0.1802	0.1027	2.14	0.82	0.6893	0.3043	0.463	0.787
0.33	0.2260	0.1847	0.1089	2.09	0.83	0.6969	0.3041	0.468	0.770
0.34	0.2355	0.1891	0.1153	2.05	0.84	0.7043	0.3038	0.473	0.753
0.35	0.2450	0.1935	0.1218	2.00	0.85	0.7115	0.3033	0.453	0.736
0.36	0.2546	0.1978	0.1284	1.958	0.86	0.7186	0.3026	0.458	0.720
0.37	0.2642	0.2020	0.1351	1.915	0.87	0.7254	0.3018	0.485	0.703
0.38	0.2739	0.2062	0.1420	1.875	0.88	0.7320	0.3007	0.488	0.687
0.39	0.2836	0.2102	0.1490	1.835	0.89	0.7384	0.2995	0.491	0.670
0.40	0.2934	0.2142	0.1561	1.797	0.90	0.7445	0.2980	0.494	0.654
0.41	0.3032	0.2182	0.1633	1.760	0.91	0.7504	0.2963	0.496	0.637
0.42	0.3130	0.2220	0.1705	1.724	0.92	0.7560	0.2944	0.497	0.621
0.43	0.3229	0.2258	0.1779	1.689	0.93	0.7612	0.2921	0.498	0.604
0.44	0.3328	0.2295	0.1854	1.655	0.94	0.7662	0.2895	0.498	0.588
0.45	0.3428	0.2331	0.1929	1.622	0.95	0.7707	0.2865	0.498	0.571
0.46	0.3527	0.2366	0.201	1.590	0.96	0.7749	0.2829	0.496	0.553
0.47	0.3627	0.2401	0.208	1.559	0.97	0.7785	0.2787	0.494	0.535
0.48	0.3727	0.2435	0.216	1.530	0.98	0.7817	0.2735	0.489	0.517
0.49	0.3827	0.2468	0.224	1.500	0.99	0.7841	0.2666	0.483	0.496
0.50	0.3927	0.2500	0.232	1.471	1.00	0.7854	0.2500	0.463	0.463

y = depth of flow, m (ft)
D = diameter of pipe, m (ft)
A = area of flow, m^2 (ft^2)
R= hydraulic radius, m (ft)
Source: USBR (1974)

Q = discharge by Manning's Equation, m^3/s (ft^3/s)
n = Manning's coefficient
S = channel bottom and water surface slope
α = units conversion = 1.49 for SI, 1 for CU

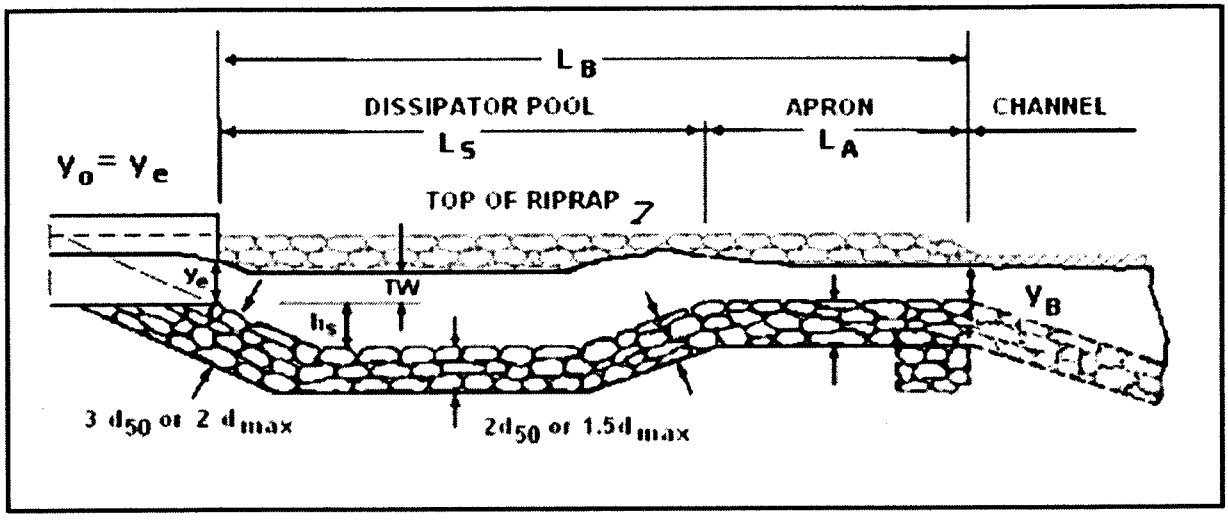


Figure 10.1. Profile of Riprap Basin

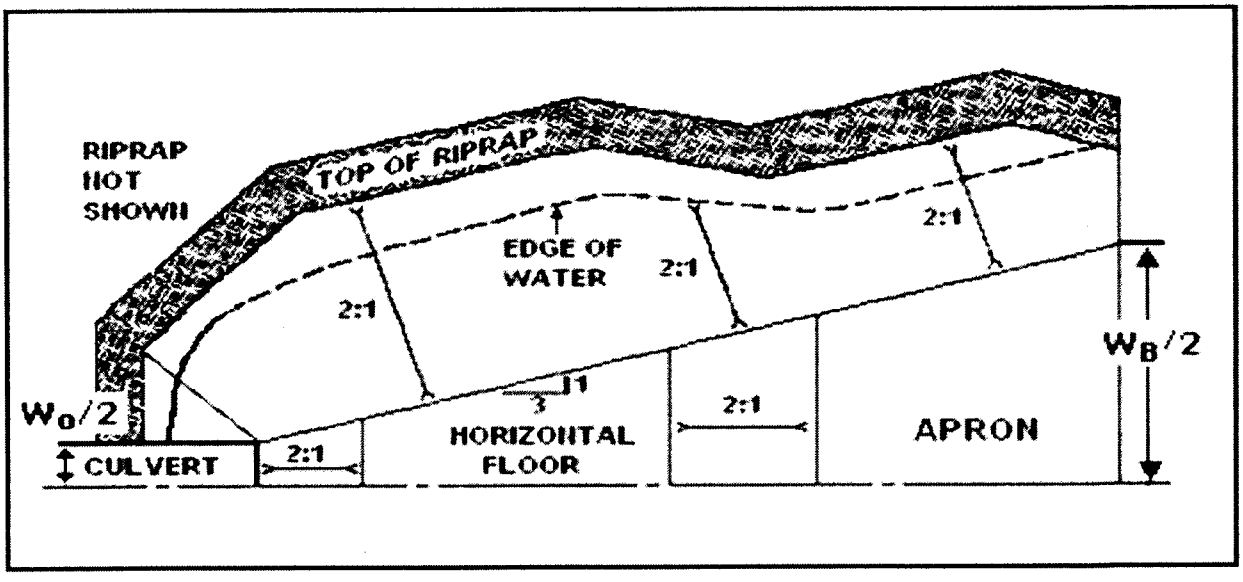


Figure 10.2. Half Plan of Riprap Basin

BMP NOTES

DRAINAGE AREA = 7.4± ACRES
IMPERVIOUS COVER = 2.8± ACRES (38%)

300 LF TO REGIONAL FACILITY

OUTLET CHANNEL

PROPERTY BOUNDARY

DRAINAGE AREA

BMP

11C

19B

29B

STONEHOUSE ELEMENTARY SCHOOL

RPA

RPA

SOIL TYPE BOUNDARY

N

GRAPHIC SCALE

150' 0' 150' 300'

SCALE: 1" = 150'

SOIL CHARACTERISTICS - JAMES CITY & YORK COUNTIES AND THE CITY OF WILLIAMSBURG, VA

SOILS NO.	SOIL NAME	HYDROLOGIC SOIL GROUP	TYPICAL SLOPES	EROSION FACTOR ($K_{(w)}$) WHOLE SOIL	EROSION FACTOR (T)	WATER TABLE UPPER LIMIT (FT)
11C	CRAVEN COMPLEX	C	6-10%	0.32	5	2.0-3.0
11C	UCHEE COMPLEX	A	6-10%	0.10-0.28	5	3.5-5.0
19B	KEMPSVILLE FINE SANDY LOAM	B	2-6%	0.24-0.28	4	-
19B	EMPORIA FINE SANDY LOAM	C	2-6%	0.24-0.28	4	3.0-4.5
29B	SLAGLE FINE SANDY LOAM	C	2-6%	0.24-0.28	5	1.5-3.0

INFORMATION TAKEN FROM USDA NATURAL RESOURCES CONSERVATION SERVICE, SURVEY AREA VERSION: 11, SURVEY AREA VERSION DATED: 01/11/2010.

SOIL SUSCEPTIBILITY TO EROSION CLASSIFICATION (K)
0.23 AND LOWER - LOW ERODIBILITY
0.23 TO 0.36 - MODERATE ERODIBILITY
0.36 AND UP - HIGH ERODIBILITY

THE MAP SHOWN IS A "BEST FIT MODEL" OF THE SCS MAPS WITH EXISTING BASE INFORMATION.

No.	Description	Date

AES CONSULTING ENGINEERS
Hampton Roads | Central Virginia
5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188
Phone: (757) 253-0040
Fax: (757) 220-8994
www.aesva.com

STONEHOUSE ELEMENTARY SCHOOL

DRAINAGE STUDY

STONEHOUSE DISTRICT JAMES CITY COUNTY VIRGINIA

Project Contacts:	REC/BVC
Project Number:	W10119-E-04
Scale: 1"=150'	Date: 2/2/2011

Sheet Title:
GIS BASEMAP

Sheet Number
-

DRAINAGE CALCULATIONS

FOR

STONEHOUSE ELEMENTARY

SITE:

James City County

SUBMITTED TO:

Environmental Division
James City County

Prepared By:

AES Consulting Engineers
5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188

April 18, 2012

AES Project No. W10119-E-04

AES
CONSULTING ENGINEERS

TABLE OF CONTENTS

STORM WATER NARRATIVE

PROJECT DESCRIPTION
This project involves the conversion of an existing dry pond into a constructed wetlands BMP at Stonehouse Elementary.

EXISTING SITE CONDITIONS
The existing site is a dry pond located in the northern corner of the Stonehouse Elementary School property.

ADJACENT PROPERTIES
The project is bordered on the northeast and northwest by wooded areas, on the southwest by grass field, and on the south by the school parking lot.

SOILS
The project area consists of 11C-Craven-Uchee complex and 19B Kempsville-Emporia Fine Sandy Loam with slopes ranging from 2 to 50 percent.

CRITICAL EROSION AREAS
There are areas of 25% slope impacts in this project. These amount to 0.166 acres or 25.9% of the total disturbed area.

STORMWATER MANAGEMENT & WATER QUALITY
Stormwater Management and water quality will be attained for this project through the use of the proposed Constructed Wetlands. The constructed wetlands consist of forebays at the locations of incoming pipes, deep pools that will remain wet, and the normal pool volume. Sizing of the facility is based on the Treatment Volume of 12,894 cubic feet. Of this volume, deep pool should provide 25% (3,224 cubic feet) and the normal pool should provide 50% (6,447 cubic feet). According to the Virginia DCR Stormwater Design Specification No. 13, deep pools consist of the deep wet pool, micropool, and forebay areas.

The proposed wetlands will provide 11,538 cubic feet of total treatment volume. The deep pools have a volume of 3,165 cubic feet. The normal pool includes the volume provided under elevation 83.22 which totals 5,120 cubic feet.

The channel protection volume required for the drainage area to the pond is 20,720 cubic feet. The channel protection volume provided is 24,609 cubic feet at the riser elevation of 85.26. An emergency spillway is provided at elevation 87.00 which will be utilized during 100-year storm events.

Rip-rap outlet protection is provided at both the outfalls of the incoming pipes in the proposed wetlands. It is also provided at the outfall of the proposed storm system.

RESULTS & CONCLUSIONS

Due to the constraints of the existing pond design full compliance with the DCR technical specifications for a constructed wetlands can not be achieved. Specifically the 1 year Channel Protection Volume is provided, but at a depth greater than the 1 foot recommended. All other requirements regarding volume to be provided in the wet pool and extended detention volume are provided. Based on this analysis the new facility will have a higher pollutant removal efficiency as a constructed wetlands than the existing dry extended detention facility located on site. Therefore this facility as designed will improve the water quality benefits from the site, and maintain the water quantity controls consistent with the original facility.

Stonehouse Elementary School Dam
CALCULATION FOR SCS HYDROGRAPH GENERATION AND CHANNEL PROTECTION
FOR Existing Pond
Project No. W10119-E-04
25-Feb-11

I. **PRE-DEVELOPMENT CONDITIONS TO POINT OF CONCERN**

A. Pre-Development Drainage Area to Point of Concern = 7.39 Acres

B. Pre-development Land Use, Soil Classification and Calculation of Composite Curve Number

	Soil Type	Soil Hydrologic Group	Pre-Development Land Use	Area of Land Use (in Acres)	Curve Number for Land Use (CN)	Adjusted (CN)
1)	Composite B/C Soils	C	Open Space (Good)	4.59	74	340
2)	Impervious Cover	N/A	Impervious Cover	2.8	98	274
3)					0	0
4)					0	0
5)					0	0
6)					0	0
7)					0	0
	Totals =			7.39		614
	Composite CN =					83

C. Pre-Development Time of Concentration Calculations

1) Overland Flow (maximum 300 feet)

Surface description (table 5-7)	Dense grasses	
Manning's roughness coefficient., n (table 5-7)	0.24	
Length of overland flow, L	50	Feet
2-year 24-hour rainfall, P2	3.6	inches
Average slope of overland flow , s	0.03	feet per foot
Travel time, Tt = (0.007*(n*L)^0.8)/(P2^0.5*s^0.4)	0.11	hours

2) Shallow concentrated flow (maximum 300 feet)

Surface description, paved or unpaved	unpaved	
Length of shallow concentrated flow, L	300	Feet
Average slope of shallow concentrated flow, s	0.02	feet per foot
Average velocity, v	1.0	feet per second
Travel time, Tt = L/(3600*v)	0.08	hours

3) Channel or Pipe Flow

Length of channel flow, L	550	Feet
Average velocity of channel flow, v	1.5	feet per second
Travel time, Tt = L/(3600*v)	0.10	hours

69

Total Time of Concentration = 0.29 hours or 18 minutes

AES
CONSULTING ENGINEERS

Project:	Stonehouse Dam
Project No.:	W10119-04
Subject:	1 yr-24 hr Drawdown Calculation
	Kerplunk Method
Date:	3/9/2012 (Revised: 4/9/2012)
Calculated By:	GVC

Channel Protection Volume:

Drainage Area	=	7.39	Acres
Runoff Curve No.	=	83	
1-Yr, 24-Hr Storm Volume	=	2.8	Inches

Direct Runoff (From TR55 Equations 2-3 & 2-4)
Q = 1.29 inches

Channel Protection Volume = DA x Q x 60% (Virginia Stormwater Managment Handbook section 5-6.2 - Method 2)

Vcp = 5.71 Ac-in = 20,720 cubic feet

Determine Volume of Pond by Contour (starting at invert of low flow orifice):

Elevation	Incremental Depth	Area (sq. ft.)	Volume (cu. ft.)	Volume (cu. yd.)	Sum Volume (cu. ft.)	Sum Volume (cu. yd.)	Incremental Avg Head[1] (feet)	Incremental Avg Flow[1] (feet)	Incremental Drawdown Time[1] (hrs)
78.7	0.0	304	-	-	-	-			
79.7	1.0	719	512	19	512	19	0.50	0.24	0.59
80.7	1.0	1,235	977	36	1,489	55	1.50	0.49	0.56
81.7	1.0	1,851	1,543	57	3,032	112	2.50	0.64	0.67
82.0	0.3	4,209	848	31	3,880	144	3.14	0.72	0.33
83.0	1.0	7,787	5,998	222	9,878	366	3.78	0.80	2.09
84.0	1.0	8,684	8,236	305	18,113	671	4.78	0.90	2.53
85.0	1.0	9,617	9,151	339	27,264	1,010	5.42	0.96	0.75
86.0	1.0	10,595	10,106	374	37,370	1,384	0.00	0.00	0.00
87.0	1.0	11,973	11,284	418	48,654	1,802	0.00	0.00	0.00
88.0	1.0	14,395	13,184	488	61,838	2,290	0.00	0.00	0.00
		Total	61,838	2,290					4.22

[1] Incremental values computed from Channel Protection Volume Elevation

Elevation of Low Flow Orifice Invert	=	82.22	feet
Elevation of 1-yr, 24-hr Storage Volume	=	84.28	feet
Size of Orifice	=	4.00	inches *
Total Average Drawdown Time	=	4.22	hrs

NOTE: MAINTAINING EXISTING LOW FLOW ORIFICE SIZE

Hydraflow Table of Contents

W10119-E-04_Existing Pond and Proposed Wetlands.gpw

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2012 by Autodesk, Inc. v9

Thursday, 00 15, 2012

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2012 by Autodesk, Inc. v9

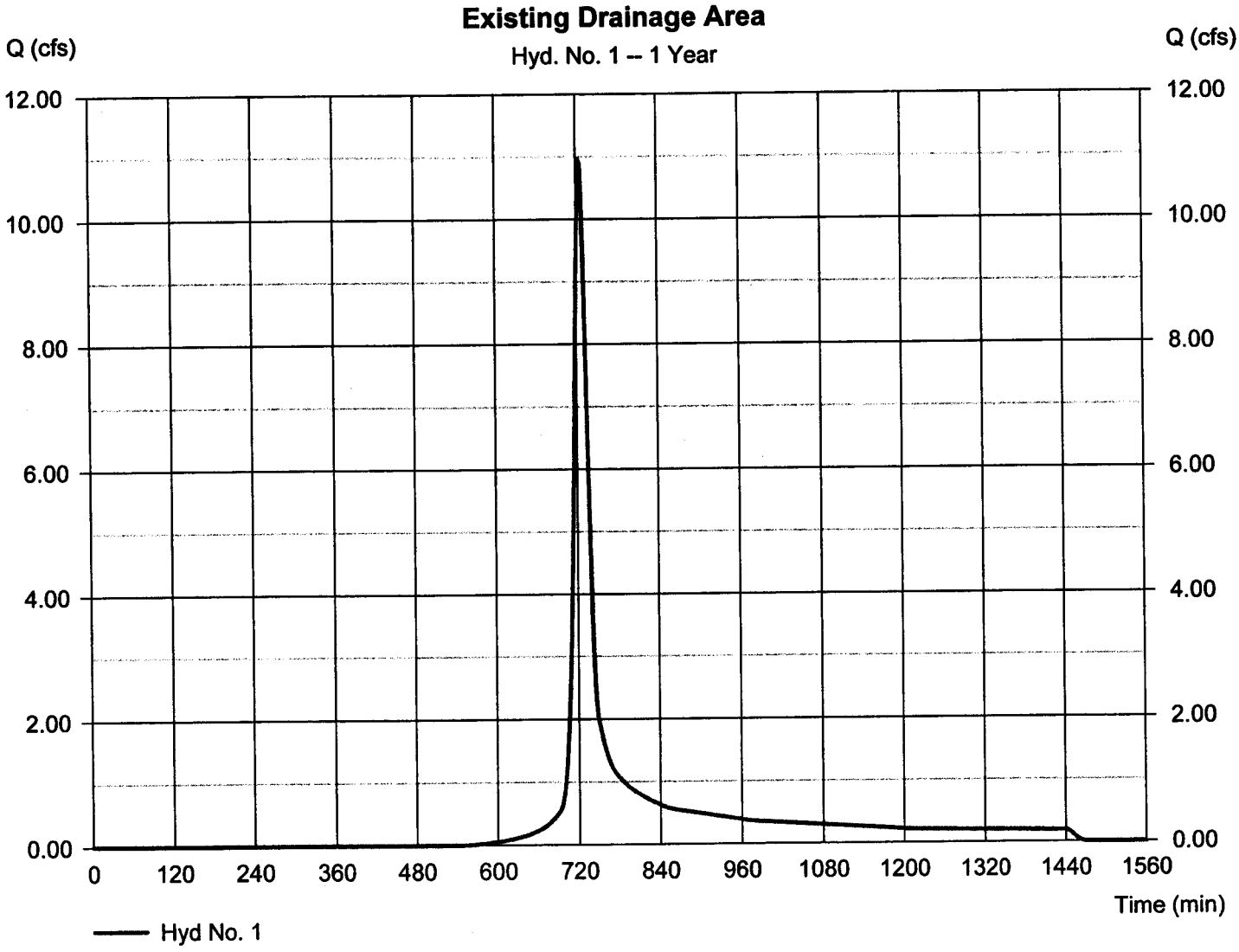
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	10.95	2	724	34,533	-----	-----	-----	Existing Drainage Area
2	Reservoir	0.579	2	852	30,184	1	84.29	20,597	Existing Pond Routed

Hydrograph Report

Hyd. No. 1

Existing Drainage Area

Hydrograph type	= SCS Runoff	Peak discharge	= 10.95 cfs
Storm frequency	= 1 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 34,533 cuft
Drainage area	= 7.390 ac	Curve number	= 83
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	=	Time of conc. (Tc)	= 18.00 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

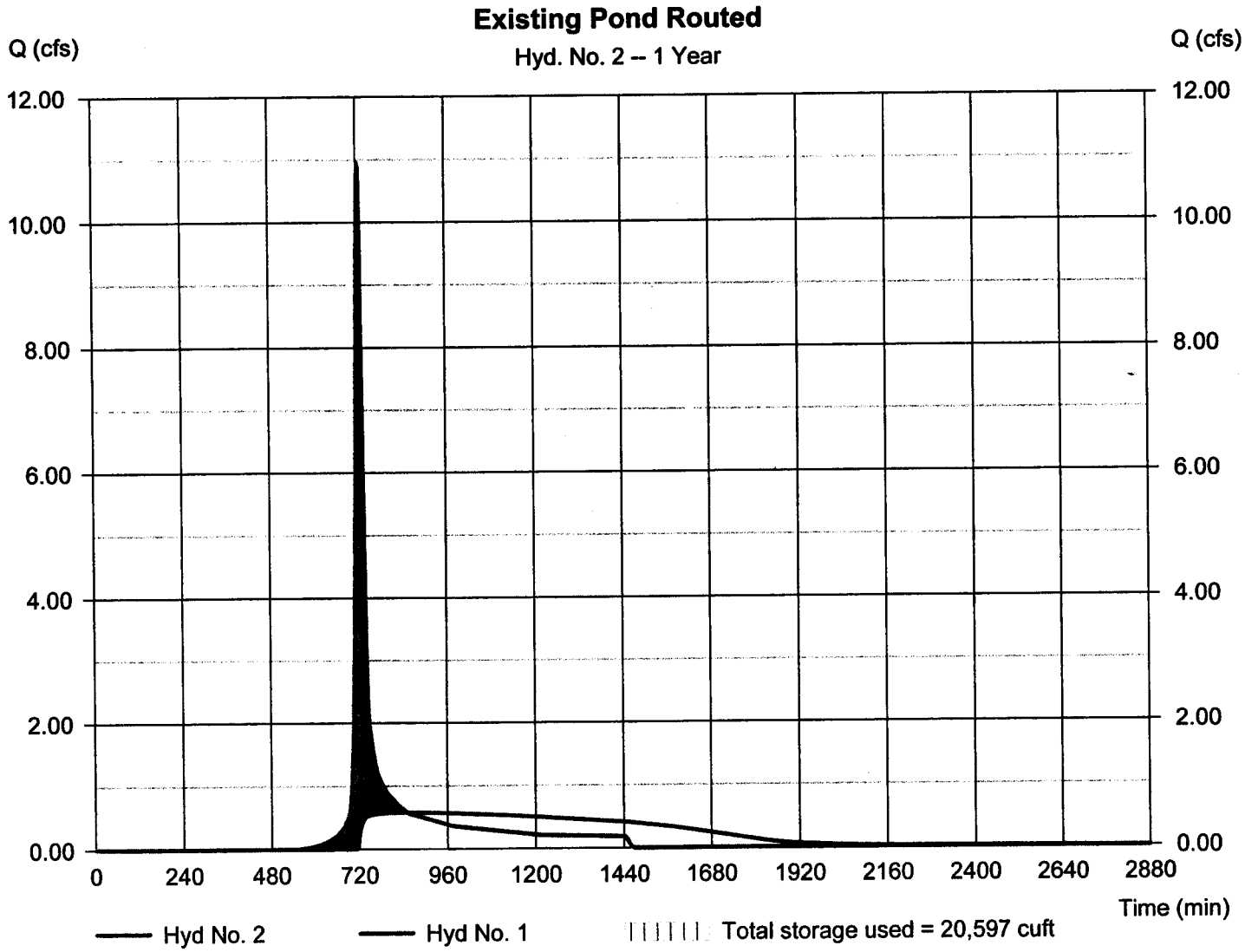
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2012 by Autodesk, Inc. v9 — Thursday, 00 15, 2012

Hyd. No. 2

Existing Pond Routed

Hydrograph type	= Reservoir	Peak discharge	= 0.579 cfs
Storm frequency	= 1 yrs	Time to peak	= 852 min
Time interval	= 2 min	Hyd. volume	= 30,184 cuft
Inflow hyd. No.	= 1 - Existing Drainage Area	Max. Elevation	= 84.29 ft
Reservoir name	= Existing Pond	Max. Storage	= 20,597 cuft

Storage Indication method used. Wet pond routing start elevation = 79.92 ft.



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2012 by Autodesk, Inc. v9 Thursday, 00 15, 2012

Pond No. 1 - Existing Pond

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 78.72 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	78.72	304	0	0
1.00	79.72	719	497	497
2.00	80.72	1,235	965	1,462
3.00	81.72	1,851	1,532	2,995
3.28	82.00	4,209	826	3,821
4.28	83.00	7,787	5,906	9,727
5.28	84.00	8,684	8,231	17,958
6.28	85.00	9,617	9,146	27,103
7.28	86.00	10,595	10,101	37,204
8.28	87.00	11,973	11,276	48,480
9.28	88.00	14,395	13,164	61,644

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	4.00	0.00	0.00
Span (in)	= 24.00	4.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 79.06	82.22	0.00	0.00
Length (ft)	= 49.00	0.00	0.00	0.00
Slope (%)	= 3.63	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

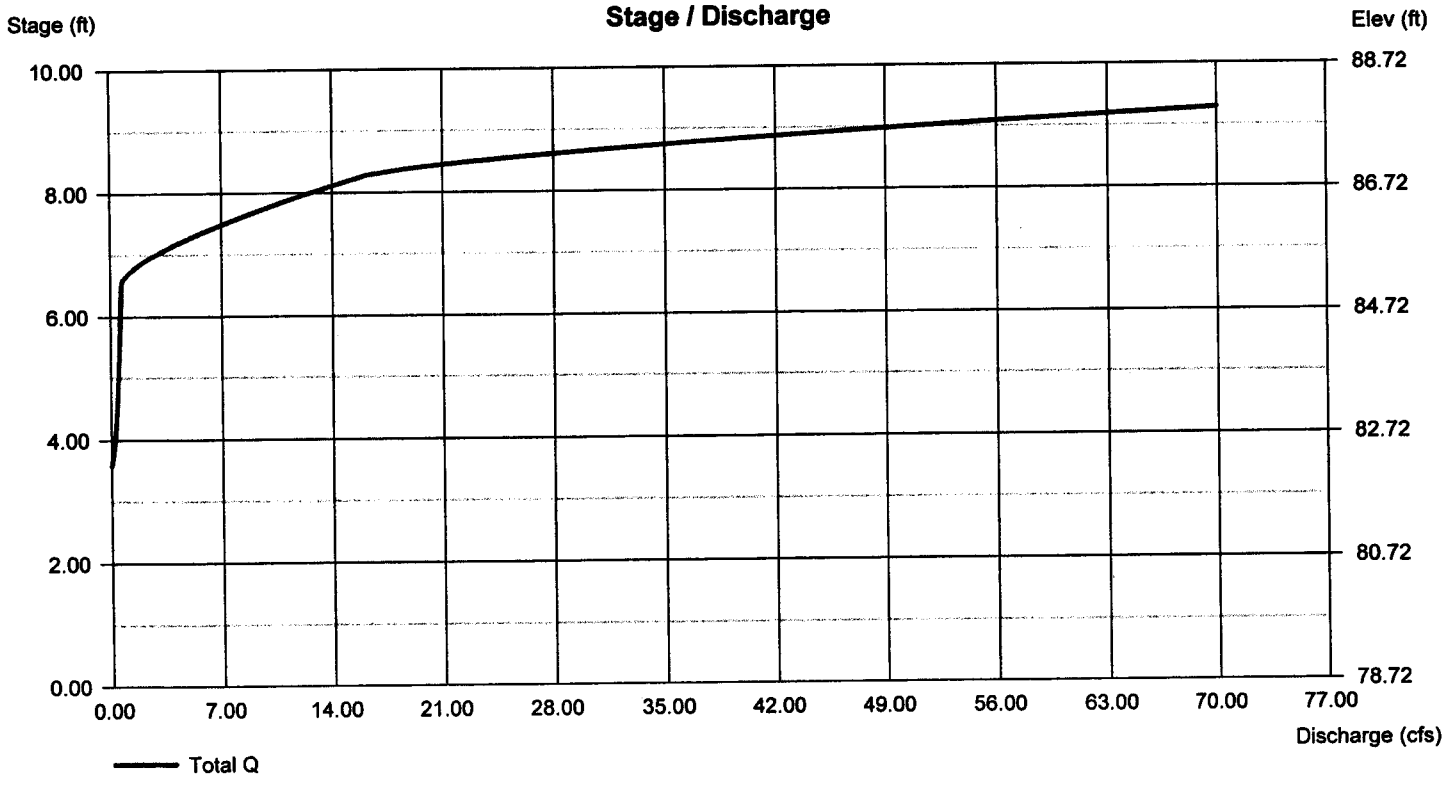
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 2.00	15.00	0.00	0.00
Crest El. (ft)	= 85.26	87.00	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= Rect	Broad	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2012 by Autodesk, Inc. v9

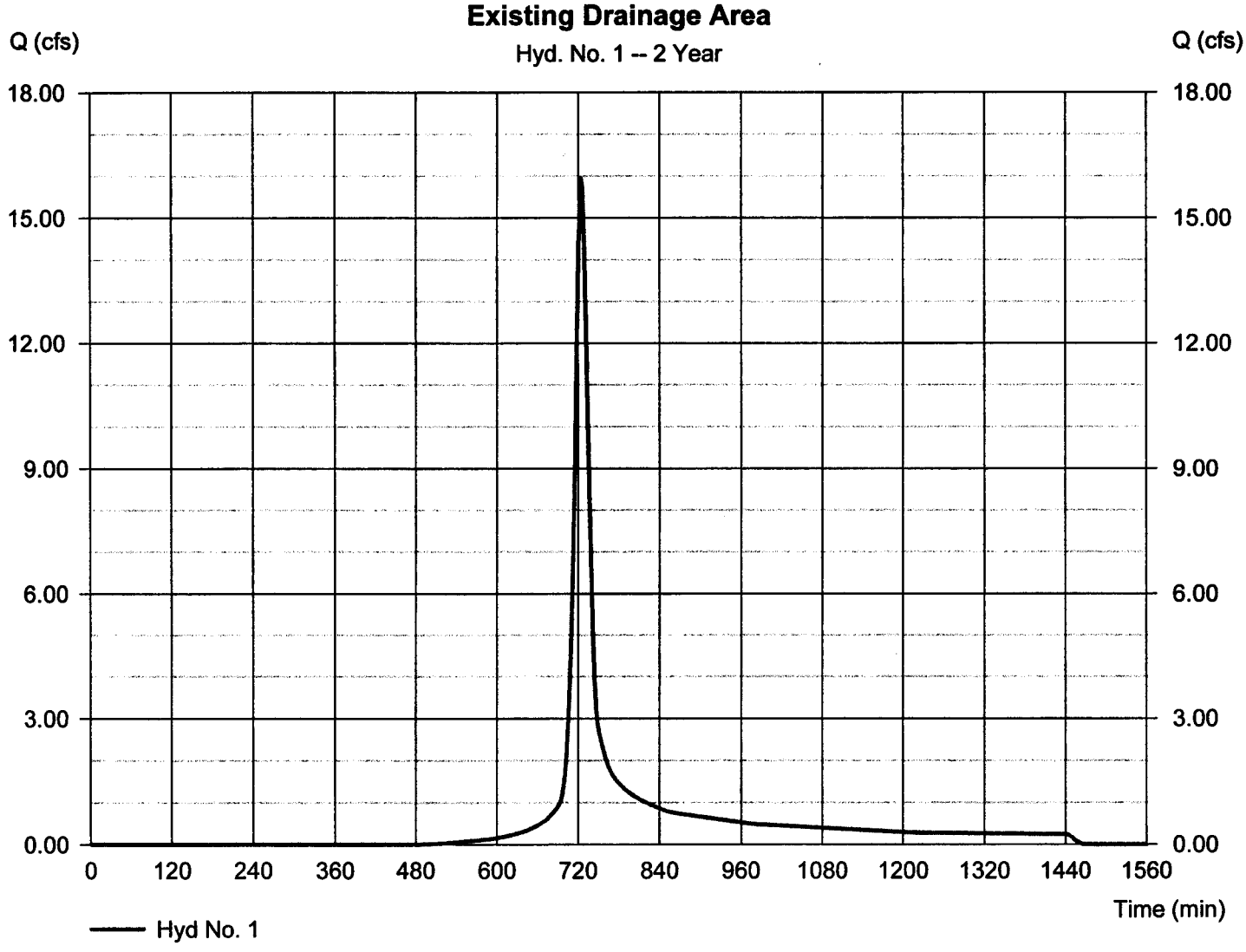
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	15.93	2	724	49,857	-----	-----	-----	Existing Drainage Area
2	Reservoir	0.901	2	834	45,508	1	85.34	30,564	Existing Pond Routed

Hydrograph Report

Hyd. No. 1

Existing Drainage Area

Hydrograph type	= SCS Runoff	Peak discharge	= 15.93 cfs
Storm frequency	= 2 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 49,857 cuft
Drainage area	= 7.390 ac	Curve number	= 83
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	=	Time of conc. (Tc)	= 18.00 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



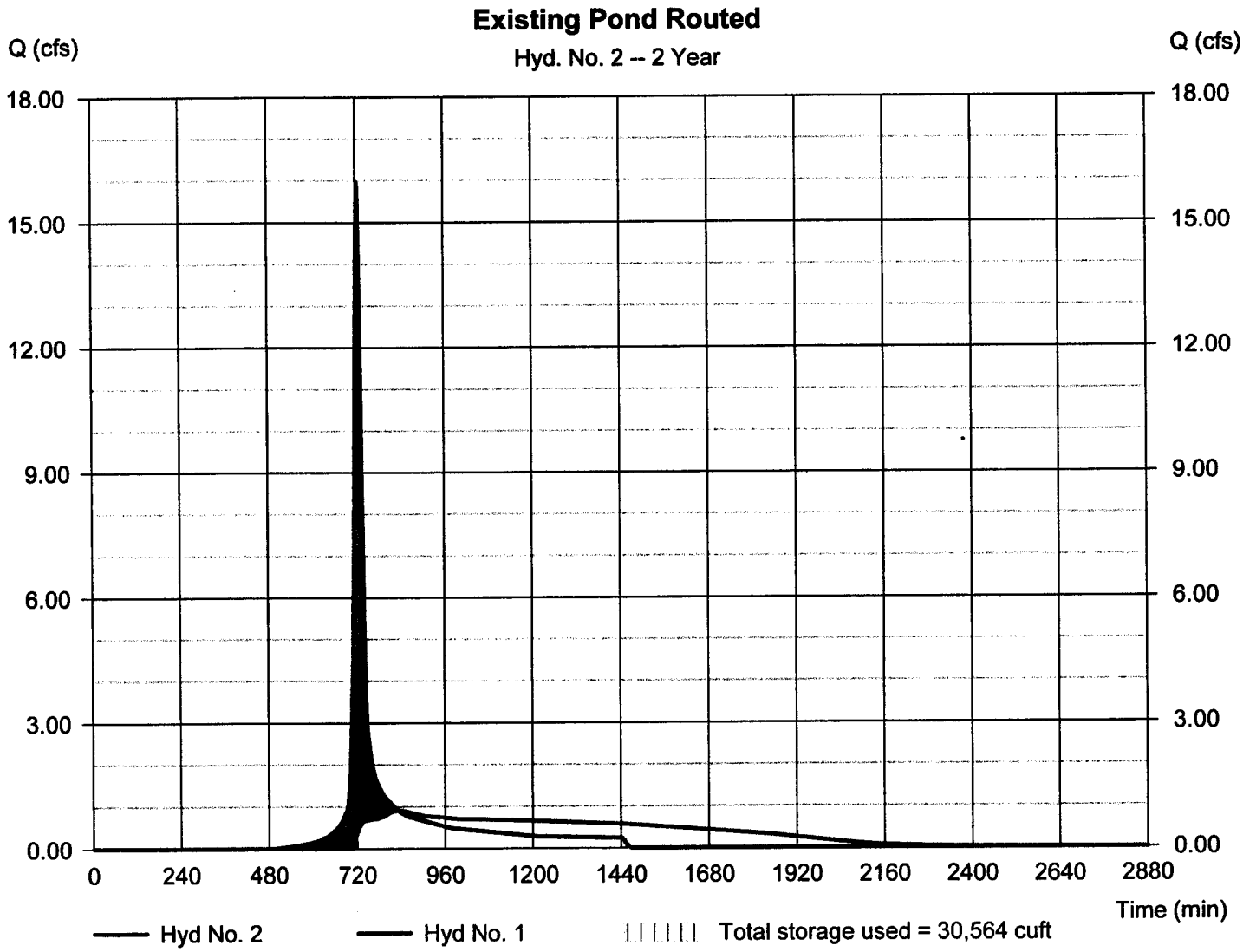
Hydrograph Report

Hyd. No. 2

Existing Pond Routed

Hydrograph type	= Reservoir	Peak discharge	= 0.901 cfs
Storm frequency	= 2 yrs	Time to peak	= 834 min
Time interval	= 2 min	Hyd. volume	= 45,508 cuft
Inflow hyd. No.	= 1 - Existing Drainage Area	Max. Elevation	= 85.34 ft
Reservoir name	= Existing Pond	Max. Storage	= 30,564 cuft

Storage Indication method used. Wet pond routing start elevation = 79.92 ft.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2012 by Autodesk, Inc. v9

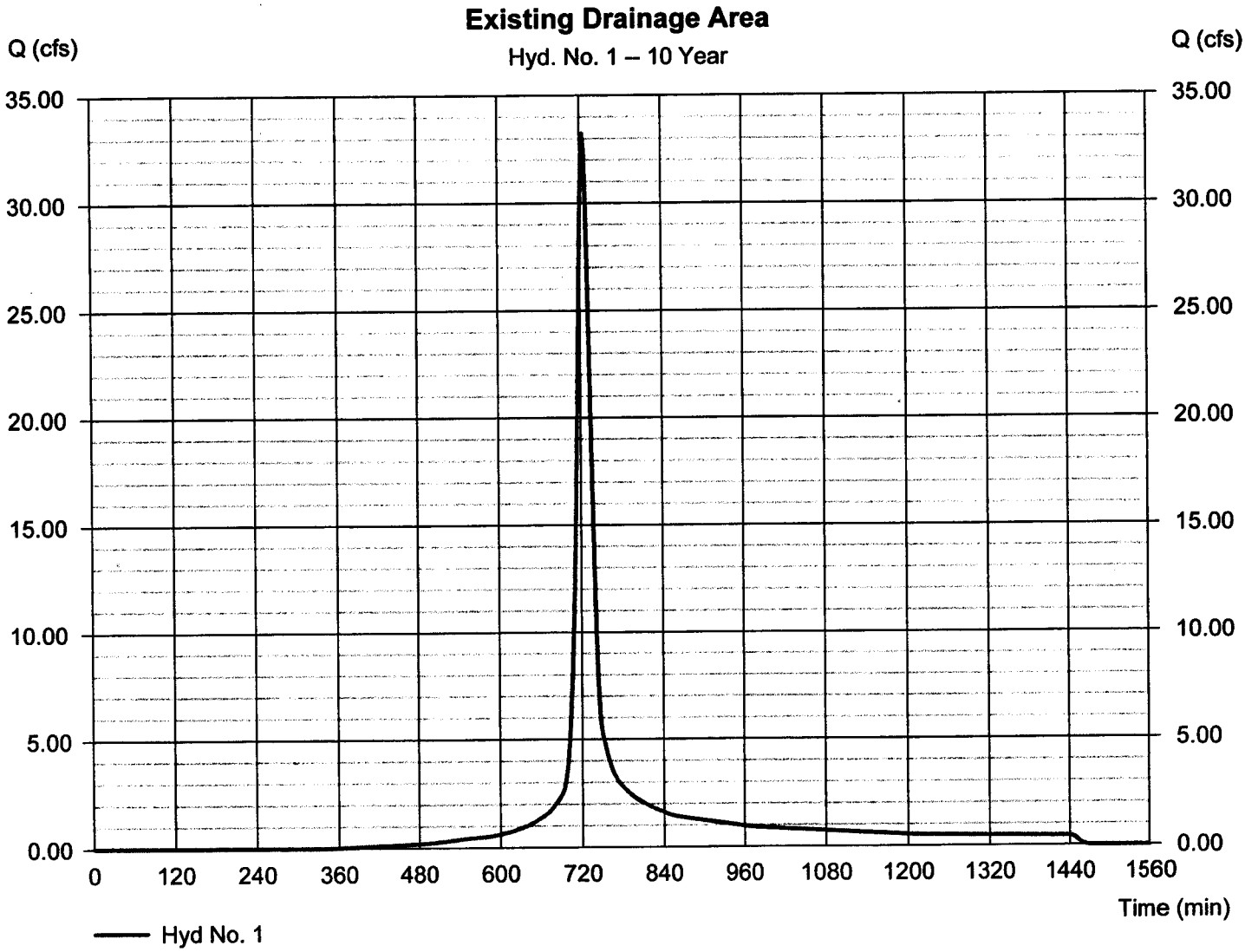
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	33.23	2	724	104,785	-----	-----	-----	Existing Drainage Area
2	Reservoir	14.80	2	738	100,436	1	86.89	47,280	Existing Pond Routed

Hydrograph Report

Hyd. No. 1

Existing Drainage Area

Hydrograph type	= SCS Runoff	Peak discharge	= 33.23 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 104,785 cuft
Drainage area	= 7.390 ac	Curve number	= 83
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	=	Time of conc. (Tc)	= 18.00 min
Total precip.	= 5.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



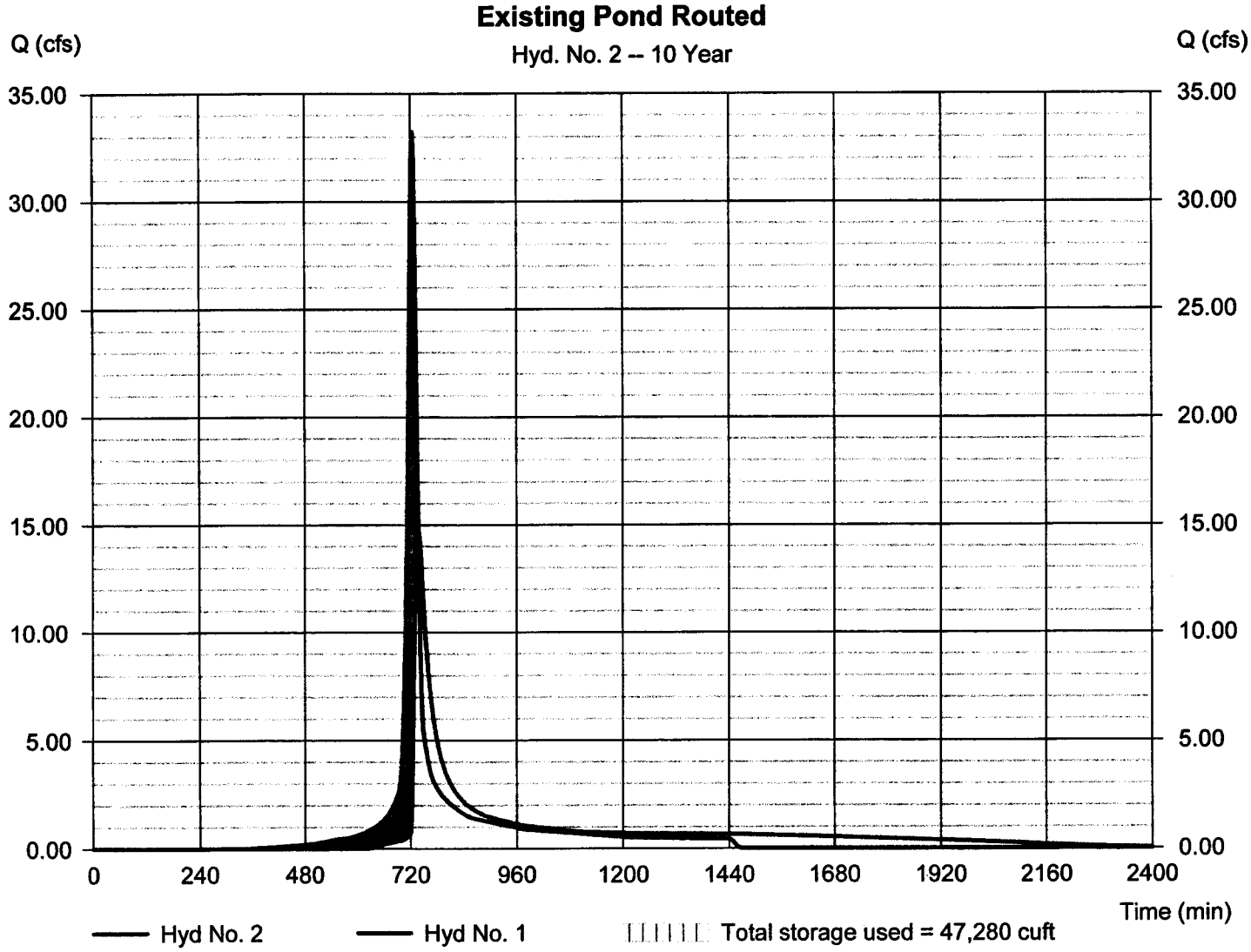
Hydrograph Report

Hyd. No. 2

Existing Pond Routed

Hydrograph type	= Reservoir	Peak discharge	= 14.80 cfs
Storm frequency	= 10 yrs	Time to peak	= 738 min
Time interval	= 2 min	Hyd. volume	= 100,436 cuft
Inflow hyd. No.	= 1 - Existing Drainage Area	Max. Elevation	= 86.89 ft
Reservoir name	= Existing Pond	Max. Storage	= 47,280 cuft

Storage Indication method used. Wet pond routing start elevation = 79.92 ft.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2012 by Autodesk, Inc. v9

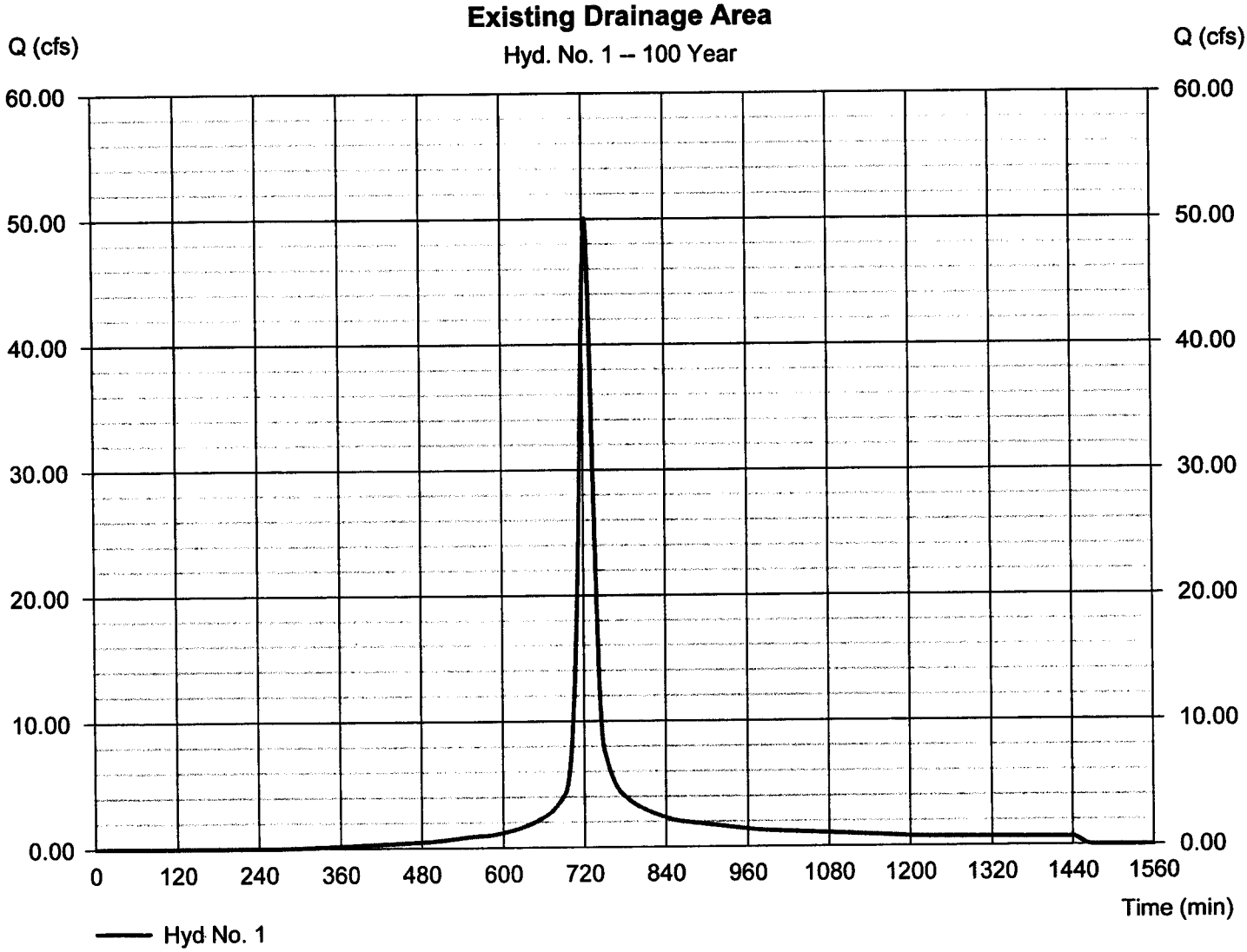
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	50.07	2	724	160,348	-----	-----	-----	Existing Drainage Area
2	Reservoir	40.67	2	730	155,999	1	87.56	55,877	Existing Pond Routed

Hydrograph Report

Hyd. No. 1

Existing Drainage Area

Hydrograph type	= SCS Runoff	Peak discharge	= 50.07 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 160,348 cuft
Drainage area	= 7.390 ac	Curve number	= 83
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	=	Time of conc. (Tc)	= 18.00 min
Total precip.	= 8.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

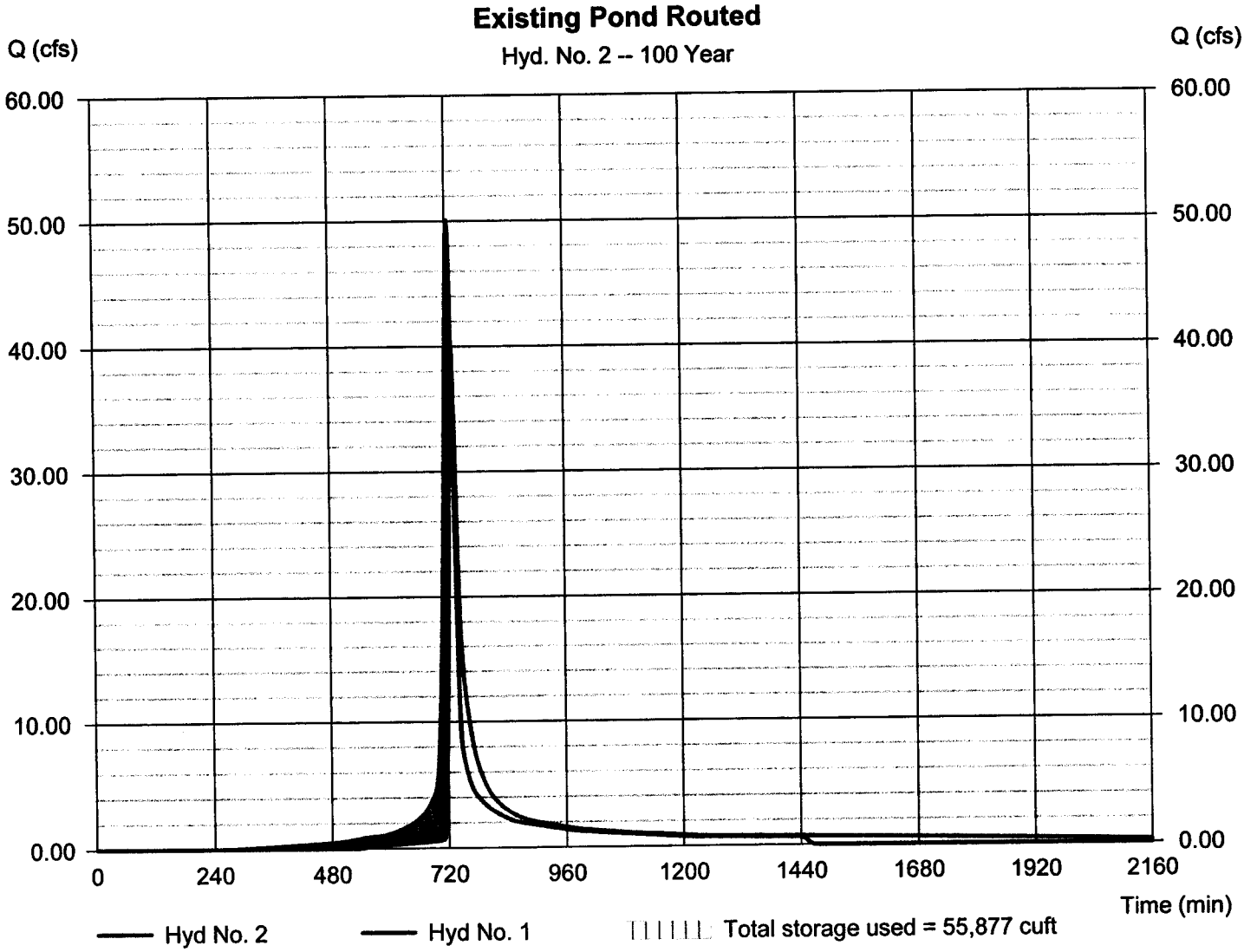
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2012 by Autodesk, Inc. v9 — Thursday, 00 15, 2012

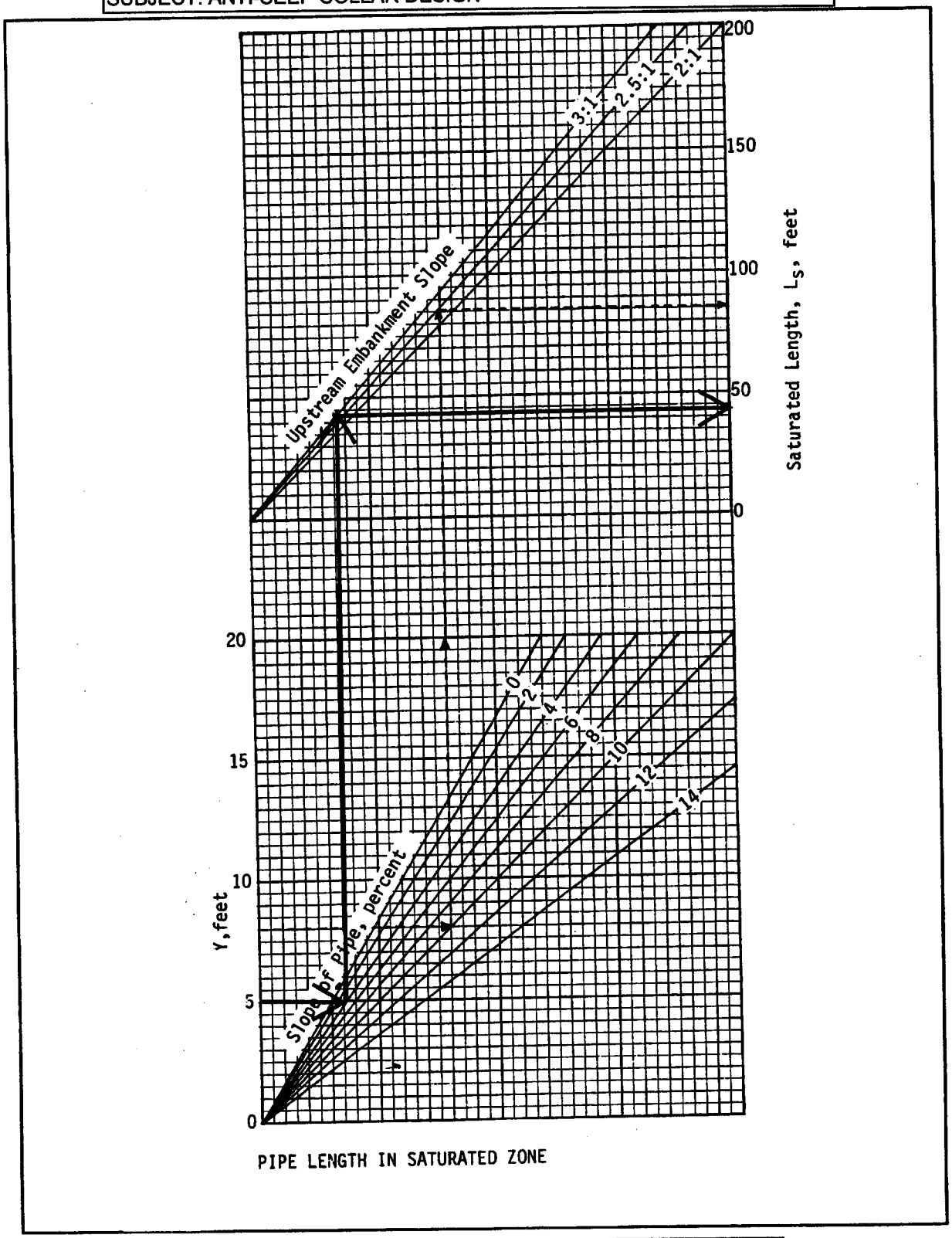
Hyd. No. 2

Existing Pond Routed

Hydrograph type	= Reservoir	Peak discharge	= 40.67 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 155,999 cuft
Inflow hyd. No.	= 1 - Existing Drainage Area	Max. Elevation	= 87.56 ft
Reservoir name	= Existing Pond	Max. Storage	= 55,877 cuft

Storage Indication method used. Wet pond routing start elevation = 79.92 ft.

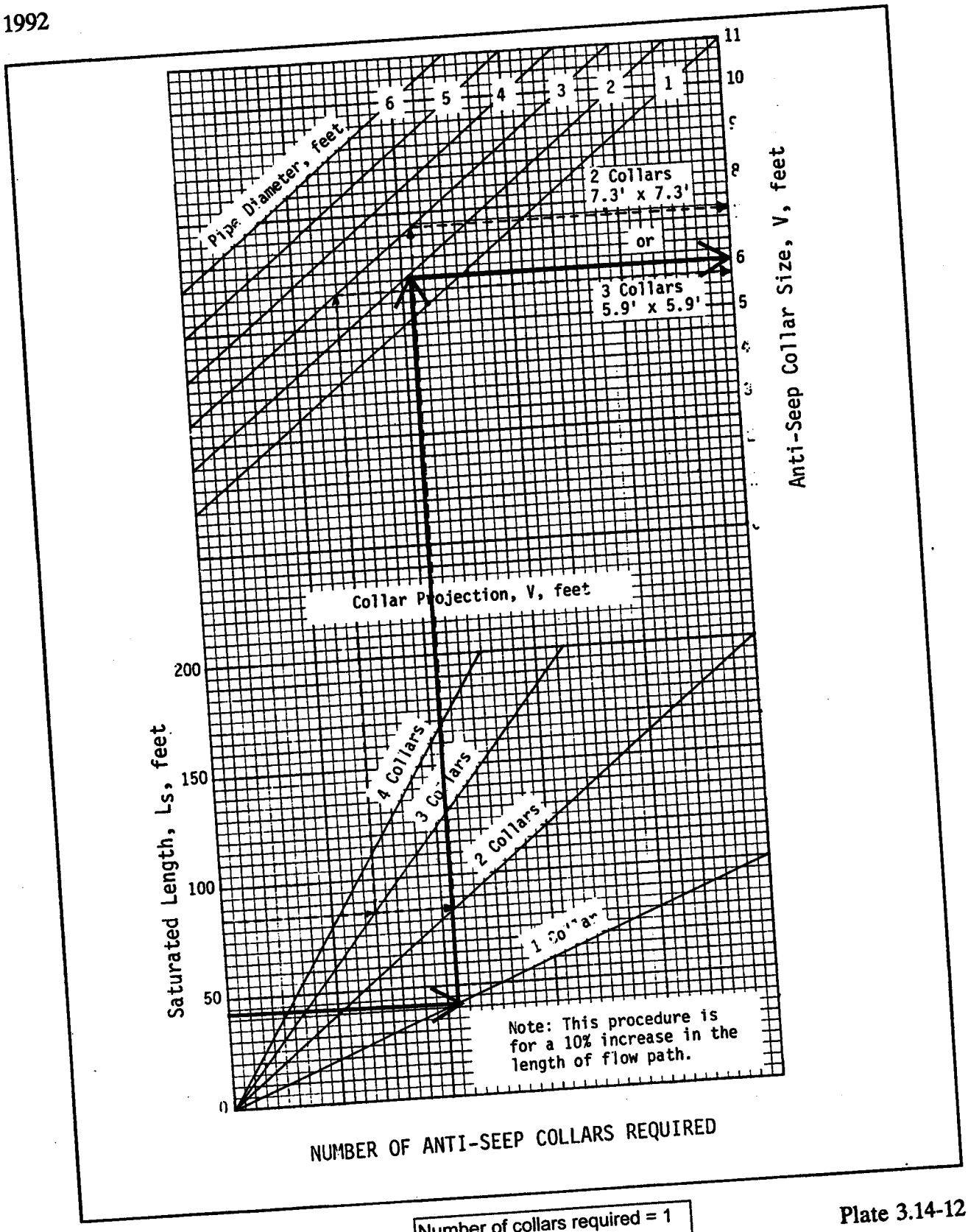




Source: USDA-SCS

Depth of water at principal spillway crest (Y) =	5 ft.
Slope of upstream face of embankment (Z) =	3 :1.
Slope of principal spillway barrel (Sb) =	3.79 %

Plate 3.14-11

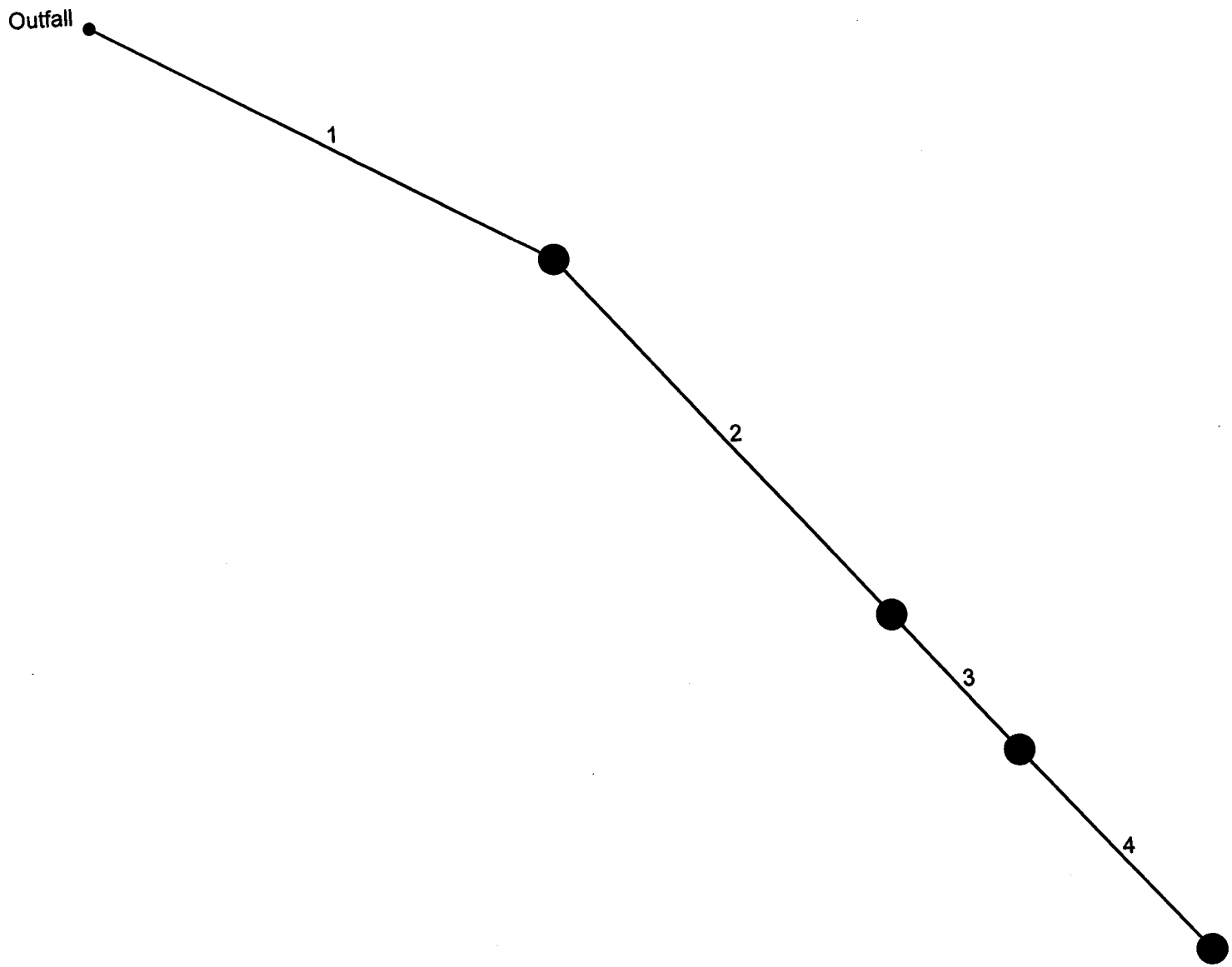


Number of collars required = 1
Dimensions = 6'x6'

Plate 3.14-12

Source: USDA-SCS

Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2012 Plan



Project File: W10119-04_Storm System Calcs.stm

Number of lines: 4

Date: 4/9/2012

Storm Sewers v9.00

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	73.000	0.46	0.57	0.45	0.21	0.27	5.0	5.1	9.3	43.15	52.94	13.78	24	5.48	63.00	67.00	64.97	68.97	63.00	72.00	1-2 TO 1-1
2	1	69.000	0.11	0.11	0.55	0.06	0.06	5.0	5.0	9.3	41.23	59.34	13.18	24	6.88	67.00	71.75	68.97	73.71	72.00	75.75	1-3 TO 1-2
3	2	26.000	0.00	0.00	0.00	0.00	0.00	0.0	0.1	0.0	24.49	71.52	8.12	24	10.00	71.75	74.35	73.71	76.10	75.75	81.70	1-4 TO 1-3
4	3	39.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	24.49	43.76	11.05	24	3.74	77.60	79.06	78.67	81.87	81.70	85.26	OS TO 1-4

Project File: W10119-04_Storm System Calcs.stm | Number of lines: 4 | Run Date: 4/9/2012

NOTES:Intensity = 473.32 / (Inlet time + 30.90) ^ 1.10; Return period =Yrs. 100 ; c = cir e = ellip b = box

AES
CONSULTING ENGINEERS

Project:	Stonehouse Elementary Dam
Project No.:	W10119-04
Subject:	Outlet Protection
Date:	9/15/2011 (Revised:4/9/2012)
Calculated By:	GVC

Outlet Location: Storm System Outfall

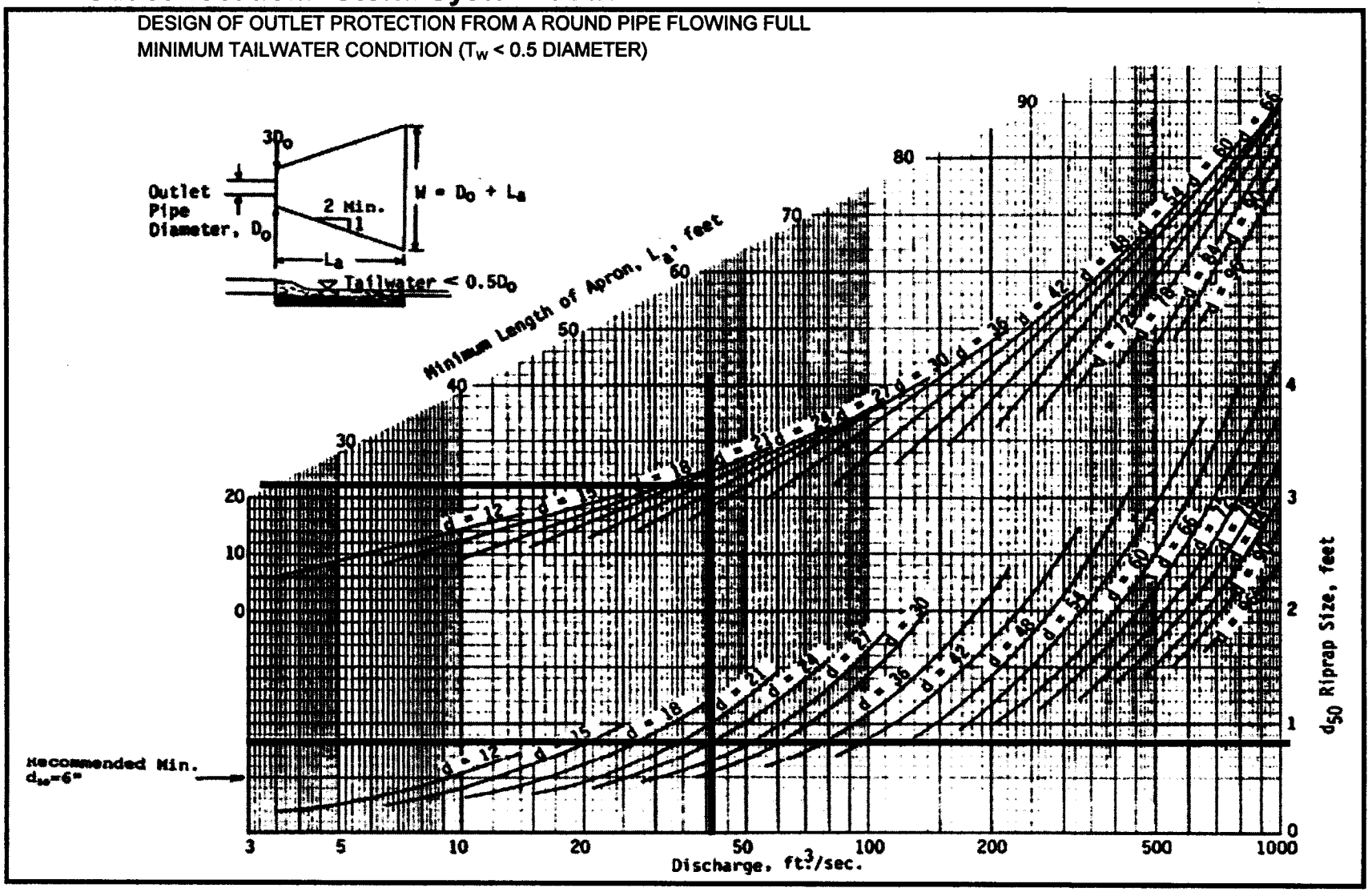
Source: USDA-SCS

III - 164

Plate 3.18-3

1992

3.18



Q =	43.15	cfs	$3D_o$ =	6	ft	W =	24	ft	Depth = 1.5 ft
D_o =	24	in	L_a =	22	ft	d_{50} =	0.8	ft	

BMP NOTES

DRAINAGE AREA = 7.4± ACRES

IMPERVIOUS COVER = 2.8± ACRES (38%)

300 LF TO REGIONAL FACILITY

OUTLET CHANNEL

PROPERTY BOUNDARY

DRAINAGE AREA

BMP

11C

19B

29B

STONEHOUSE ELEMENTARY SCHOOL

RPA

RPA

N

SOIL TYPE BOUNDARY

GRAPHIC SCALE

150' 0' 150' 300'

SCALE: 1" = 150'

SOIL CHARACTERISTICS - JAMES CITY & YORK COUNTIES AND THE CITY OF WILLIAMSBURG, VA

SOILS NO.	SOIL NAME	HYDROLOGIC SOIL GROUP	TYPICAL SLOPES	EROSION FACTOR (K_w) WHOLE SOIL	EROSION FACTOR (T)	WATER TABLE UPPER LIMIT (FT)
11C	CRAVEN COMPLEX	C	8-10%	0.32	5	2.0-3.0
11C	UCHEE COMPLEX	A	8-10%	0.10-0.28	5	3.5-5.0
19B	KEMPSVILLE FINE SANDY LOAM	B	2-6%	0.24-0.28	4	-
19B	EMPORIA FINE SANDY LOAM	C	2-6%	0.24-0.28	4	3.0-4.5
29B	SLAGLE FINE SANDY LOAM	C	2-6%	0.24-0.28	5	1.5-3.0

INFORMATION TAKEN FROM USDA NATURAL RESOURCES CONSERVATION SERVICE, SURVEY AREA VERSION: 11, SURVEY AREA VERSION DATED: 01/11/2010.

SOIL SUSCEPTIBILITY TO EROSION CLASSIFICATION (K)
0.23 AND LOWER - LOW ERODIBILITY
0.23 TO 0.36 - MODERATE ERODIBILITY
0.36 AND UP - HIGH ERODIBILITY

THE MAP SHOWN IS A "BEST FIT MODEL" OF THE SCS MAPS WITH EXISTING BASE INFORMATION.

No.	Date	Description	Symbol

AES CONSULTING ENGINEERS
4219 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188
Phone: (757) 253-0040
www.aesva.com
Hampton Roads | Central Virginia | Middle Peninsula

STONEHOUSE ELEMENTARY SCHOOL
DRAINAGE STUDY
JAMES CITY COUNTY VIRGINIA
STONEHOUSE DISTRICT

Project Contacts:	REC/SVC
Project Number:	W10119-E-04
Scale: 1"=150'	Date: 2/2/2011

Sheet Title:
GIS BASEMAP

Sheet Number
-

AES
CONSULTING ENGINEERS

Project:	Stonehouse Dam
Project No.:	W10119-E-04
Subject:	Outlet Protection
Date:	3/10/2012
Calculated By:	LRB

Outlet Location: 18" PIPE OUTFALL

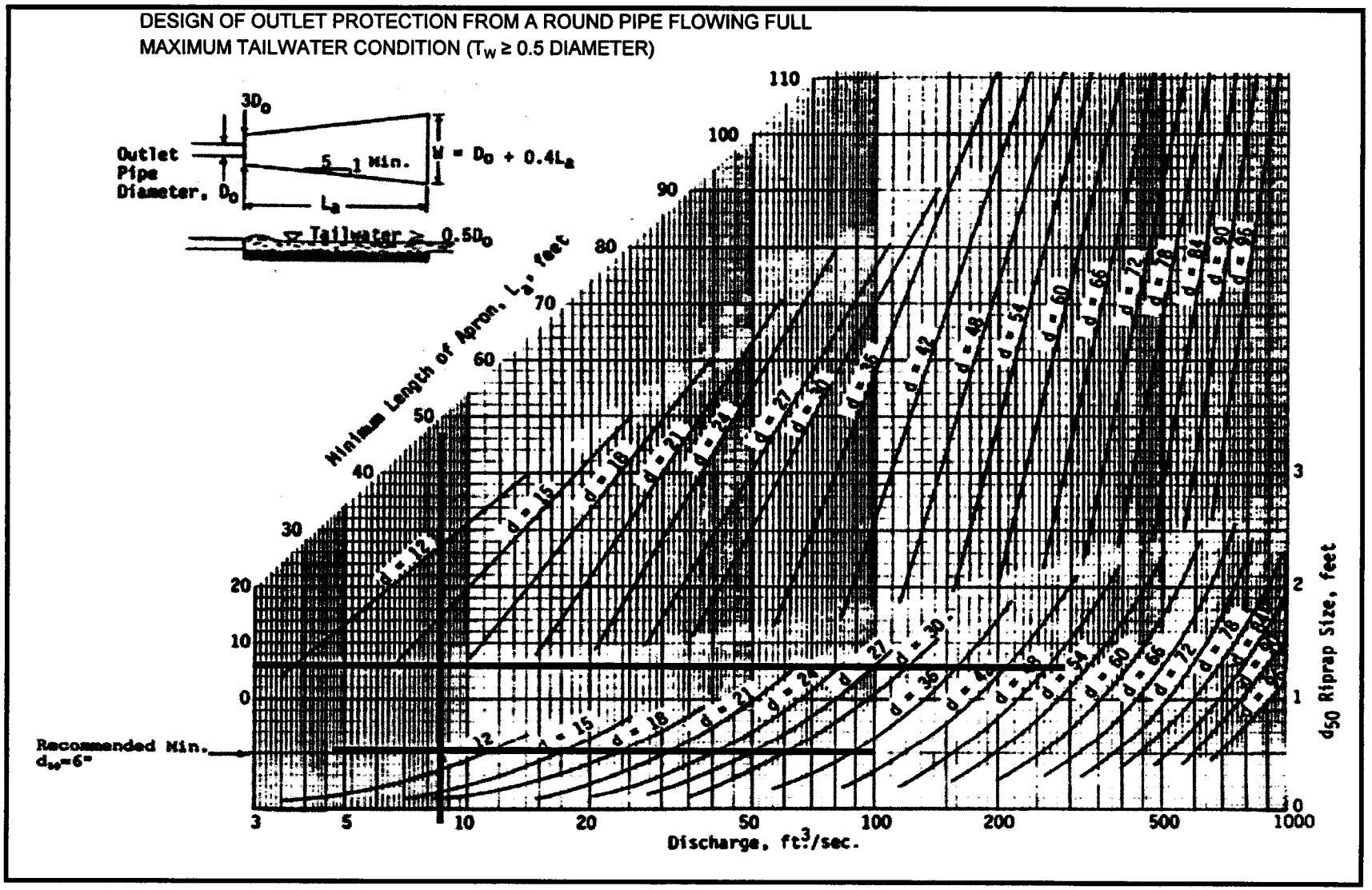
Source: USDA-SCS

1992

III - 165

Plate 3.18-4

3.18



Q =	8.75	cfs	$3D_0$ =	4.5	ft	W =	5	ft	Depth = 1.5 ft
D_0 =	18	in	L_a =	8	ft	d_{50} =	0.5	ft	

TRANSMITTAL

DATE: September 27, 2013

TO: Records Management (1 copy)
JCSA (3 copies)
Fire (1 copy)
Engineering and Resource Protection (1 copy)
Virginia Department of Transportation (1 copy)

FROM: Jose Ribeiro, Senior Planner

SUBJECT: SP-0039-2012, Stonehouse Elementary School Stormwater Facility Retrofit/Repair

TAX ID: **1310100020**

ACTION: For your files.